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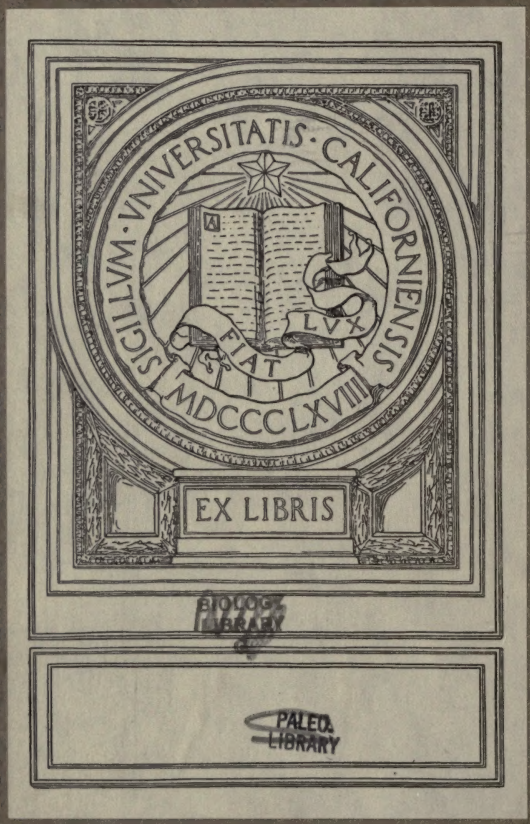

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OF

CONCHOLOGY;

STRUCTURAL AND SYSTEMATIC.

WITH ILLUSTRATIONS OF THE SPECIES.

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BY GEORGE W. TRYON, JR.

CONSERVATOR OF THE CONCHOLOGICAL SECTION OF THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA.

VOL. VIII.

NATICIDÆ, CALYPTRÆIDÆ, TURRITELLIDÆ, VERMETIDÆ, CÆCIDÆ, EULIMIDÆ, TURBONILLIDÆ, PYRAMIDELLIDÆ.

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MANUAL OF CONCHOLOGY.

Family *NATICIDÆ*.

Shell subglobular, spiral, or paucispiral, with or without epidermis, the margin of the aperture entire. Operculum absent, or present and paucispiral or concentric, corneous or calcareous.

Animal with voluminous foot, often incapable of entirely withdrawing into its shell; eyes at the base of the tentacles, often subcutaneous; shell often partially or entirely covered by the mantle. Dentition 3·1·3.

The Naticidæ have been monographed by

Reeve, Conch. Iconica: Natica, 143 sp., 1855. Sigaretus, 26 sp., 1864. Vanikoro, 24 sp., 1875.

Philippi, in Küster's Conchylien Cabinet, 1852: Natica, 190 species.

Weinkauff, in Küster: Sigaretus, 37 species, 1883.

Sowerby, in Thesaurus Conchyliorum: Sigaretus, 28 sp., 1882. Vanikoro, 24 sp., 1884. Natica, 144 sp., 1883.

Recluz, in Chenu's Illustrations Conchyliologiques, etc.

The present work admits about 225 recent species belonging to the family; many of those recognized by previous monographers being considered synonyms: besides these there are many unfigured and undetermined forms.

Subfamily I. *Naticinæ*.

Shell turbinate, subglobose or auriform, the spire usually short; aperture entire, without canal or sinus, the outer lip sharp, not reflected or margined, the columellar lip callous, more or less reflected over the umbilicus. Operculum calcareous or corneous, paucispiral (Pl. 1, figs. 12–14).

Animal with small tentacles, which are lanceolate, wide apart, connected by a veil; eyes absent, or placed under the skin, behind the tentacles; foot much produced in front, where it is furnished with a fold (propodium) covering the head and anterior margin of the shell; operculigerous lobe very ample, partially enveloping the shell; mantle enclosed. Jaws corneous, waved or tessellated, subtrigonal (Pl. 1, fig. 3). Central tooth of the radula trapezoidal, generally tricuspidate, lateral teeth with a central large and smaller cusps, inner marginals simple or bifid, outer marginals simple (Pl. 1, figs. 4–6).

The animals of Naticidæ, characterized by the cephalic disk forming the propodium, are completely retractile within the shell in the typical Natica, but not retractile in Sigaretus and Mamilla. In some species of Neverita, the posterior margin of the propodium forms on the left side a sort of fleshy siphon; the operculigerous lobe, which encircles the shell sometimes has a sinus on the right side, probably for the introduction of water into the branchial cavity.

The Natica (Pl. 7, fig. 43) is an active animal, carnivorous and very predaceous, living in sandy places, where it hides under the surface and burrows for bivalves. These it pierces with its tongue, boring a round hole, generally near the beaks, where the shell of the victim is thinnest. The eyes, hidden by the propodium, and subcutaneous, are generally not perceptible, but can be distinguished in the group Amaura.

The Nidus (Pl. 7, figs. 44, 45) is unlike that of any other mollusk in form and composition, being built up largely of the sand of the sea-bottom, agglutinated into a strap, forming part of a circle, and provided on one side with a constriction or rim; the walls contain the eggs, arranged in quincunx order.

Subfamily II. *Lamellariinæ.*

Shell thin, sigaretiform, more or less internal, generally paucispiral, sometimes reduced to a non-spiral auriform lamina; spire short, few-whorled, lateral; aperture oval, entire, large. No operculum.

The animal (Pl. 1, figs. 18, 19) has not the cephalic disk of Natica. The mantle gradually grows over the shell until the latter becomes, in some of the genera, completely internal; eyes

on prominences at the base of the tentacles. Dentition, Pl. 1, fig. 9.

The Lamellariinæ are carnivorous, living upon Hydrozoa, Alcyonaria and compound Ascidiæ. The eggs are deposited in the midst of colonies of the latter. The first embryonic shell is nautiloid, with spiral ridges; the second is more simple, resembling a Carinaria; these shells are united at their margins by a thin membrane. The pelagic larval forms have received the names of Brownia, Echinospira, Calcarella and Jasonilla. See Manual, ii, t. 8, f. 103–105; Structural and Syst. Conch., i, 130, t. 20, f. 51.

Subfamily III. *Vanikoridæ.*

Shell external, white, with sometimes a velvety epidermis, usually striated, costate or decussated; umbilicated, without a trace of callus. Operculum thin, corneous, non-spiral.

Animal with a long snout, tentacles flattened, much dilated in the middle, narrow above; eyes sessile at their external base; mantle margin simple; foot profoundly bipartite, a narrow, truncated, elongated propodium and a larger, rounded or subquadrangular, operculigerous metapodium; a large epipodial veil on each side of the foot; branchia a single row of triangular leaflets, partly free. Jaws flattened; radula short and wide, having, according to Gray, two series of teeth (?).

Synopsis of Genera.

I. *Naticinæ.*

Genus NATICA, Adanson, 1757.

Shell oval globular, porcellanous, solid, generally smooth, covered by a fine epidermis, which is transparent, and generally not very persistent; umbilicated, or umbilicus more or less filled with callus; aperture semilunar, vertical, the outer lip simple. Operculum large, semilunar, paucispiral, corneous or calcareous.

Animal with large cephalic lobe, truncated in front, subquadrangular.

Subgenus NATICA (*sensu stricto*).

Shell smooth, solid, brightly colored in bands, spots, stripes, etc. Operculum calcareous (Pl. 1, figs. 12, 13). *N. canrena*, Linn.

The species are numerous; mostly inhabitants of warm seas, in all quarters of the globe. The genus first appeared in the jurassic formation. The fossil forms are remarkable for the persistence of their colors. *Nacca*, Risso, is a synonym.

Section STIGMAULAX, Mörch, 1852.

Whorls cancellated or grooved. *N. cancellata*, Lam.

Subgenus NEVERITA, Risso, 1826.

Shell large, depressed orbicular, spire conical or flattened; umbilicus open, or partly filled by a tongue-shaped callous process (funiculum) of the columella. Operculum corneous. Dentition, Pl. 1, fig. 6. *N. duplicata*, Say.

The shell of Neverita is usually larger sized, sombre colored, and not so solid as that of Natica. The group inhabits mostly temperate waters.

Section NEVERITA (typical).

Umbilicus partly filled by a tongue-shaped callous process of the columella.

Section LUNATIA, Gray, 1847.

Shell subglobose, large, umbilicus open, without funiculum. Almost insensibly connects with *Neverita*. Operculum, Pl. 1, fig. 14. *N. heros*, Say.

Section PAYREAUDAUTIA, Bucquoy, Dautzenberg and Dollfus, 1883.

Umbilicus furnished with two funicular plications; shell small, variegated. *N. intricata*, Donovan.

Appears to connect with the typical group which it resembles in coloration, but distinguished by its umbilicus and operculum.

Section MAMMA, Klein, 1753.

Shell oval or suboval, solid, smooth, usually unicolored, white or yellowish; aperture semilunar, inner lip oblique, callous, the callus extending into and more or less completely filling the umbilicus. *N. uber*, Val.

Polinices, Montf., 1810, *Mamillaria*, Swains., 1840, *Naticina*, Guilding, 1834, and *Naticella*, Guilding, 1840, are synonyms.

Section CEPATIA, Gray, 1840.

Shell rotelliform; umbilicus closed by a large callosity, a pliciform lamella on the upper part of the columellar lip. Fossil only. *N. cepacea*, Lam. Eocene.

Velainia, Munier-Chalmas, 1884, is a synonym.

Section MAMILLA, Schum., 1817.

Shell oval conic, rather thin, the whorls oblique, rapidly enlarging; white or fasciated with brown; mouth oblong, inner lip narrow, reflected, usually brown or blackish; umbilicus not funiculated. *N. maura*, Lam.

The synonyms are *Naticaria*, Swainson, 1840, and *Ruma* (Chemn.), H. and A. Adams, 1853.

Subgenus AMPULLINA, Lam. *fide* Defrance, 1821.

Umbilicus without funiculum, sometimes open, sometimes closed by a callosity; columellar margin usually convex, the umbilical region limited by a spiral ridge.

Globularia, Swainson, is a synonym.

Only one living species belongs in this group; the rest are tertiary fossils.

Section AMPULLINA (*sensu stricto*).

Spire short, aperture large. *N. sigaretina*, Lam. Eocene, Paris (Struct. and Syst. Conch., t. lxiv, f. 66).

Ampullinopsis, Conrad, may perhaps be placed here. *Globularia*, Swains., is also a synonym.

Section AMAURELLINA, Bayle, 1885.

Spire scalariform, elongated, sharp; umbilicus with a narrow false funiculum. *N. spirata*, Lam.

Section MEGATYLOTUS, Fischer, 1885.

Callosity of the umbilical region very large, limited by a semicircular groove, distant from the columella. *N. crassatina*, Lam. Lower Miocene.

Section CERNINA, Gray, 1840.

Subglobose, polished, bright colored; aperture large; umbilical region entirely covered by a convex callosity, not limited by a groove; columellar margin convex. *N. fluctuata*, Sowb., the sole living species of this subgenus.

Anomphala, Jonas, is a synonym.

Subgenus EUSPIRA, Agassiz, 1837.

Spire more or less elevated, suture canaliculated; whorls few, angulated or carinated; umbilical fissure little marked or hidden. *N. canaliculata*, Morris and Lyc., Oolite, England. (Struct. and Syst. Conch., t. lxiv, f. 84).

Subgenus Amaura, Möller, 1842.

Shell oval, smooth, thin, imperforate, covered by an epidermis; aperture oblong, columella short, simple.

Animal with small, compact foot, the right lobe profoundly sinuated; eyes subcutaneous, but visible.

A boreal group, commencing with jurassic fossils, and containing a few living species. *N. candida*, Möller.

Section Acrybia, H. and A. Adams, 1853.

Shell globular, spire very short; columellar margin incurved, columella twisted; lip fragile. *N. flava*, Gould.

Bulbus, Brown, 1839, is a synonym.

Section Amauropsis, Mörch, 1857.

Suture canaliculated. *N. canaliculata*, Gould.

Section Pseudamaura, Fischer, 1885.

Shell more solid, longitudinally ribbed. *N. bulbiformis*, Sowb., fossil.

Section Ptychostoma, Laube, 1866.

Shell imperforate, oval; spire large, elevated, sharp; aperture oval, angular posteriorly; columella straight; the margin arcuated; lip sinuated near the suture; growth lines sinuous. *N. Pleurotomoides*, Wissman. Triassic.

? Subgenus Amaurella, A. Adams, 1867.

Shell small, imperforate, white, shining, apex submamillary, aperture acuminately ovate; lip arcuate, simple, a little thickened.

It is very doubtful where in the system these little shells should be placed. The type species was originally described as a *Macrocheilus*, but it was subsequently said to have greater affinities with *Amaura*.

Subgenus Naticopsis, M'Coy.

Shell imperforate; inner lip very thick, spreading. Operculum shelly. *N. Phillipsii*, M'Coy. Carboniferous, *Gt. Brit.* (Struct. and Syst. Conch., t. lxiv, f. 67).

Neritomopsis, Waagen, 1880, is a synonym.

Section Isonema, Meek. *I. humilis*, Meek. Devonian, Ohio (S. and S. Conch., t. lxiv, f. 71).

Section Trachydomia, Meek and Worthen, 1866.

Surface covered by small regularly disposed tubercles.

N. nodosa, M. and W. Carboniferous, *Illinois*.

Subgenus GYRODES, Conrad, 1860.

Shell depressed globose; aperture generally angular or narrowly rounded below; inner lip thin; umbilicus wide, deep, without callosity, bounded by a revolving carina which is sometimes crenate, with occasionally a second small revolving ridge within; whorls shouldered above, the angle generally wrinkled or crenate.

Cretaceous, United States, India. *N. alveata*, Conr. (S. and S. Conch., t. lxiv, f. 70).

Subgenus TYCHONIA, de Koninck, 1881.

Shell somewhat depressed, globose, smooth; spire short, obtuse, suture linear; last whorl very large, depressed at the base; aperture semilunar; lip thin; columella thickened by a callosity which is limited by a shallow oblique groove; no umbilicus.

N. Omaliana, de Koninck. Carboniferous, Belgium.

? Subgenus PLATYOSTOMA, Conrad.

Shell subglobose; spire short; aperture very large, suborbicular, dilated; labrum joining the body-whorl at right-angles to the axis of the shell.

P. Niagarensis, Hall. Niagara group, New York (S. and S. Conch., t. lxiv, f. 74).

Section STROPHOSTYLUS, Hall.

Shell subglobose, spire small, body-whorl large, ventricose; outer lip thin, sometimes slightly expanded; columella twisted or spirally grooved within, not reflected; umbilicus none. *P. subobtusa*, Hall. Lower Helderberg, *N. York* (S. and S. Conch., t. lxiv, f. 75).

Differs in its twisted or grooved columella.

Section ORIOSTOMA, Munier-Chalmas, 1876.

Umbilicus moderate, circumscribed by a carina; whorls sometimes partially free. *P. Barrandei*, Mun.-Chalm. Devonian.

The relations of this group with *Natica* are somewhat obscure, as are also those of the typical form with those designated here as sections. As in many other cases with the older fossil forms we can only be guided by rather remote general resemblances.

Tylostoma, Sharpe, is considered a member of the group by

some conchologists; I have placed it in Tornatellidæ (See Struct. and Syst. Conch., ii, 357).

Genus RUMELLA, Bourguignat, 1885.

Shell small, obliquely oval, polished, spire short, of few whorls; last whorl with a large umbilical depression, limited by a basal angle, and covered by a strong rounded callus; lip simple. Operculum unknown.

Lake Tanganika, Central Africa.

The species are said to resemble the group *Mamilla* in miniature; their position cannot be positively ascertained until we become acquainted with the animal and operculum.

Genus SIGARETUS, Lamarck, 1799.

Shell depressed ear-shaped, with minute spire and very large aperture, externally with revolving striæ; color usually white, sometimes invested with a thin corneous epidermis. Operculum minute, horny, paucispiral (Pl. 1, fig. 15).

Animal with large mantle partly or entirely covering the shell —into which it is not able to withdraw entirely. Dentition. Central tooth of the radula shorter than the lateral cusps (Pl. 1, fig. 7).

Sigaretus inhabits warm seas, on muddy sand-flats; it is sluggish and very timid, moving slowly; when crawling they constantly explore the surrounding surface with the produced forelobe of the foot, which is also used in burrowing.

Living species are rather numerous; fossil, it commences in the Cretaceous. *Catinus* (Klein, 1753), H. and A. Adams; *Lupia*, Conrad; *Stomatia*, Hill; *Cryptostoma*, Blainv., 1818, and *Raynevallia*, Ponzi, are synonyms.

Section SIGARETUS (*sensu stricto*).

Shell depressed orbicular, convex above, mouth rounded; umbilicus none or covered by a reflection of the inner lip; spire short, oblique.

Section EUNATICINA, Fischer, 1885.

Shell umbilicated, oval oblong, thin, ventricose; spire sharp; inner lip straight, thin anteriorly, with a median callus. *S. papilla*, Gmel.

It is *Naticina*, Gray, 1840 (not Guilding, 1834). *Lacunaria*,

Conrad, was referred here by me in Structural and Syst. Conch.; its species having been described as Naticæ; it is now placed in Lacunidæ.

Section AMPLOSTOMA, Stoliczka, 1868.

Subovate, thin, spire short; whorls few, the last large, ventricose, produced in front, widely excavated at base; aperture elongately ovate, subangulated, pillar lip smooth, outer lip dilated and expanded at the margin; surface nearly smooth. *S. auriformis*, Stol., Cretaceous, *So. India* (S. & S. Conch., t. lxiv, f. 85).

The characters are exceedingly close to those of the last section. *Lysis*, Gabb., 1864, which I consider a member of the subfamily Purpurinæ, of Muricidæ, has been referred to this neighborhood by Dr. Fischer.

Subfamily II. *Lamellariinæ*.

Genus LAMELLARIA, Montagu, 1815.

Shell internal, ear-shaped, thin, pellucid; spire lateral, very small; aperture large, patulous, both lips regularly arcuated; axis imperforate. No operculum.

Animal much larger than the shell, which is entirely concealed beneath the dorsal shield; shield thick, verrucose, notched in front; foot elongated, truncated in front, acuminated behind; eyes at the outer bases of the tentacles. Dentition 1·1·1, the central tooth subtrigonal, with the free margin denticulated and base incurved; laterals large, the summit lanceolate, the margins denticulate, no marginals (Pl. 1, fig. 9).

There are a few living species, and two species in the Miocene. Interesting particulars of the habits of Lamellaria will be found in Structural and Systematic Conchology, ii, 209.

The synonymy includes *Marsenia*, Leach, 1847; *Coriocella*, Blainv., 1824; *Chelinotus*, Swains., 1840; *Cryptocella*, H. & A. Adams, 1853; *Ermæa*, Gray, 1857; *Cryptothyra*, Menke, 1830. *Coriocella* and *Cryptocella* have been considered subgenera, but have no important characters; the former was founded upon an individual accidentally deprived of its shell. The fry, also, have received several generic names (p. 5).

Subgenus Marsenina, Gray, 1850.

Shell auriform, similar to Lamellaria.

Animal (Pl. 1, fig. 20) with shield only partially covering the shell, open in the middle, the anterior margin deeply incised a little to the left of the middle, and again incised at the middle of the right margin. Dentition, Pl. 1, fig. 10. *Boreal Seas.* *L. prodita*, Loven. *Colobocephalus*, Sars, is a synonym.

Genus ONCIDIOPSIS (Beck), Bergh, 1853.

Shell internal, membranous, flexible, slipper-shaped, not spiral, oblong, obtuse at the extremities.

Animal (Pl. 1, fig. 21) completely enveloping the shell; dorsal shield verrucose, thick, margin entire; foot elongated, lanceolate, exceeding the shield at either extremity; tentacles cylindrical, with eyes at their exterior bases. Dentition as in Velutina (Pl. 1, fig. 11). *Boreal Seas.* *O. glacialis*, Sars.

? Genus CALEDONIELLA, Souverbie, 1869.

Shell heliciform, imperforate, oval, orbicular, thin, invested by a thin epidermis which extends beyond the lip; spire much depressed, sublateral; whorls few, rapidly increasing; aperture oblique, rather large, the extremities of the simple lip united by a callus extending widely upon the whorl. Animal unknown.

C. Montrouzieri, Souverb. *New Caledonia.*

Genus VELUTINA, Fleming, 1822.

Shell thin, mostly external, calcareous, auriform, paucispiral, invested by a velvety epidermis; spire lateral, suture well impressed; aperture large, rounded, the lip thin, the columellar lip a little reflected. No operculum.

Animal with large oblong foot; margin of mantle developed, and more or less reflected over the edge of the shell; head broad; tentacles subulate, blunt, far apart, with eyes on prominences at their outer bases.

Dentition, 2·1·1·1·2, the central tooth subquadrangular, multicuspid, the central cusps very long and sharp; lateral teeth multicuspid, marginals narrow, with a few obsolete denticles on the margin (Pl. 1, fig. 8).

The Velutinas resemble the pulmoniferous genus Otina, but are strictly marine. Sometimes they are met with far out at sea, but usually live among stones near low-tide. *Boreal. V. lævigata*, Pennant.

? *Catinella*, Stache, is a synonym.

Section LIMNERIA, H. and A. Adams, 1853.

Spire more elevated, peristome not continuous, columella subcanaliculate. *V. undata*, Brown.

Morvillia, Gray, 1857, is a synonym.

Section VELUTELLA, Gray, 1847.

Shell in most part covered by the mantle, very thin, flexible, with short spire; peristome continuous, thickened. *V. flexilis*, Montg.

Section LEPTONOTIS, Conrad, 1866.

Margin of the aperture remarkably expanded, surpassing the spire. *V. expansa*, Whitfield. Eocene. *Alabama.*

The shell is minute, and may be embryonic.

SCÆVOGYRA, Whitfield, 1877. Struc. and Syst. Conch., iii, 350.
LYOSOMA, White, 1883. Struc. and Syst. Conch., iii, 350.

These two fossil groups, of doubtful relationships, may possibly be members of the Naticidæ.

Subfamily III. *Vanikoridæ.*

Genus VANIKORO, Quoy and Gaimard, 1832.

Shell subglobose, external, white, with a velvety epidermis, surface striate, costate or decussate, umbilicated, without a trace of callus in the umbilicus; spire not produced; aperture semilunar, outer lip simple.

Animal described in the subfamily. Operculum thin, corneous, with apical nucleus, not spiral (Pl. 1, figs. 16, 17).

A few species are found about corals in warm seas; fossil, commences with secondary strata.

About equally well-known under the later and perhaps more acceptable name of *Narica*, Recluz, 1841. *Leucotis*, Swainson, 1840, and *Merria*, Gray, 1842, are also synonyms.

Section VANIKOROPSIS, Meek, 1876.

Shell subglobose, thick, body-whorl large, spire low; imper-

forate; outer lip simple, beveled, inner lip closely folded upon and adhering to the columella and body-whorl, very little thickened, smooth; surface with distinct revolving lines and furrows, developing on the body-whorl strong oblique grooves parallel to the growth lines. *V. Tuomeyana*, Meek and Worthen. Cretaceous; *Upper Missouri River* (S. and S. Conch., t. lxiv, f. 87).

Section NATICODON, Ryckholt.

Shell like *Vanikoro*, but inner lip usually thickened, and always provided with some kind of a tooth, columella either slightly hollowed out or solid; surface smooth, or ornamented with various spiral or transverse striæ. *V. spirata*, Sowb. Carboniferous, *Europe* (S. and S. Conch., t. lxiv, f. 76).

This group forms a connecting-link between *Vanikoro* and *Neritopsis;* the former having the columellar lip smooth, the latter insinuated in the middle, or provided with two strong teeth, while *Naticodon* has only one tooth; as regards the thickness of the shell, this transition seems equally to hold good.

Section NATIRIA, de Koninck, 1881.

Shell globose, spire short, suture profound, axis perforated; surface longitudinally plicate, with intermediate parallel striæ, and slight spiral striæ; columellar margin slightly thickened; aperture nearly circular, peristome continuous. Carboniferous-Trias. *V. lirata*, Phillips.

Subfamily *Naticinæ*.

Genus NATICA, Adanson, 1757.

Subgenus NATICA (*sensu stricto*).

N. MILLEPUNCTATA, Lam. Pl. 2, figs. 22, 23, 24, 25.

Yellowish white, closely painted with small light chestnut spots, umbilical region and interior of aperture light brown; umbilicus with a central entering ridge. Length, 1·5–2 inches.

Mediterranean Sea.

Linnæus classed this among the varieties of his *N. canrena*. It is a variable species in its color markings, thus acquiring several synonyms. Among those of the typical color-variety are *N. punctata*, Karsten, and *N. stercus-muscarum*, Gmel. (juvenile). Monterosato has named a var. *minor*.

Var. MACULATA, Desh. Pl. 2, fig. 24.

The spots larger, less sharply defined, often interruptedly confluent, with three interrupted bands of larger spots or maculations.

Appears to connect closely with the type form, but has been separated as a distinct species of late years by several conchologists on account of differences in the lingual dentition. I retain the name by which the species is well known instead of the prior one of *N. hebræa*, Martyn—which has scarcely obtained currency. Other synonyms are *N. trifasciata* (Recluz), Adams; *N. aspersa*, Menke; *N. cruentata*, Payr.

Monterosato has named as color-varieties, *fusca*, *immaculata*, and *rarimaculata*. The latter appears to me to connect with the next species.

Var. SANGUINOLENTA, Brusina. Pl. 2, fig. 25.

The punctations coalescing into undulating longitudinal flammules.

N. FULMINEA, Gmelin. Pl. 2, figs 26, 27.

Shell solid, somewhat tumid and plicately striated next the suture; umbilicated, but the umbilicus partly covered by an overgrowing callous deposit on the upper part of the columellar lip, which finally becomes very thick; whitish, with longitudinal undulating or zigzag chestnut markings, sometimes partly broken up into spots; often peppered with minute spots between the larger markings; occasionally the zigzag lines break up into three revolving series. Length, 1–1·75 inches.

West Coast of Africa.

The synonymy includes *N. cruentata* and *N. arachnoidea*, Gmel.; ? *N. pardalis*, Phil.; *N. bifasciata* (Recluz), Reeve; *N. punctata*, Swainson; *N. Senegalensis*, Recluz (fig. 28) has been placed here by Reeve and Sowerby; the figure has the markings of *fulminea*, but appears to possess a more conical spire; it is probably distinct.

N. ADANSONI, Phil. Pl. 2, fig. 30.

Small, solid, yellowish maculated and spotted with chestnut, upper and lower portions of body-whorl free from spots, or

nearly so; umbilicus completely filled by the callus of the inner lip. Length, 15 mill.

W. Africa.

The shell figured by Reeve under this name (fig. 29) is a distinct species = *N. fanel*, Adanson.

N. FULGURANS, Recluz. Pl. 7, fig. 29; Pl. 2, fig. 28; Pl. 7, fig. 29.

Yellowish white, with purplish brown angulately flexuous streaks, often running together; aperture white; umbilicus partly filled by a rather large, convex, rounded central callus. Length, 25 mill.

Senegal.

Differs from *N. Adansoni* in the partly excavated umbilicus, from *N. fulminea* in its more conical spire, and less tumid shoulder of the body-whorl. *N. Senegalensis*, Recluz (fig. 28) appears to be a synonym.

N. BOURGUIGNATI, Recluz. Pl. 2, fig. 31.

Somewhat thick, with well-impressed suture; umbilicus small, contracted above by the lip callus and with an entering line; white-flamed longitudinally or punctate with dark chestnut. Length, 14–15 mill.

Madagascar.

Reeve unites this with the preceding species; if so, it is a strongly marked minor variety.

N. ZEBRA, Lam. Pl. 2, fig. 32.

Whitish, densely longitudinally painted with narrow, sharply zigzag chestnut streaks. Length, 1 inch.

Philippines.

N. PELLIS-TIGRINA, Chemn. Pl. 2, fig. 33.

Whitish, densely spotted with purplish chestnut, a little plicate at the suture. Diam. 22 mill.

Australia.

N. variolaria, Recluz, is a synonym.

N. MACULOSA, Lam. Pl. 3, fig. 35.

Spire more elevated than in the last species, umbilicus narrower, maculations obsolete towards the base of the body-whorl and sometimes near the suture also. Diam. 18 mill.

China, Japan, Philippines, Java, etc.

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It is very doubtful whether this is really distinct from the preceding species. *N. Javanica*, Lam., is a synonym.

N. FANEL, Adanson. Pl. 2, fig. 29.

Widely umbilicated, with a re-entering callous central ridge, the umbilicus bounded by a sharp angle; whorls flattened next the suture; punctate with chestnut, some of the punctations confluent into maculations, which are either irregular or form two or three interrupted revolving series.

Senegal.

Reeve changed the above barbarous specific name to Adansoni already used by Philippi. I cannot consent to re-baptize the species; better a bad than an unstable name.

N. LYNX, Phil. Pl. 2, fig. 34.

Rather thick, smooth, whitish, with light chestnut spots, umbilicus very narrow, nearly filled by the funiculate callus.

Height 6·66, diam. 5·33 mill.

Mangalore, India.

Closely resembles the preceding species in form and coloring; distinguished by its much smaller size and narrow umbilicus.

N. IMPERFORATA, Gray. Pl. 3, fig. 36; Pl. 7, figs. 27, 28.

Solid, with a heavy white callus quite closing the umbilicus, whorls a little constricted below the suture, where they are shortly chestnut-flamed, everywhere else densely minutely punctate with chestnut, with obsolete light revolving bands.

Diam. 1 inch.

Cape of Good Hope, West Africa (Marrat).

N. genuanus, Reeve (figs. 27, 28), is a younger and more perfect state of this species, with the narrow pale bands more distinct and bearing dark spots or sagittate markings.

N. FLORIDA, Reeve. Pl. 3, fig. 37.

Umbilicated, umbilicus brown stained, with a central entering ridge; whitish, with close chestnut punctations and two faint light purplish bands, sometimes obsolete. Length, 22 mill.

Hab. unknown.

N. PULICARIS, Phil. Pl. 3, figs. 38, 39.

Shell umbilicated, smooth, polished, a little flattened beneath the suture; columella callous above; whitish, closely sprinkled

with fine orange dots, with large oblique blotches on the upper part of the body-whorl (appearing also on the spire), and narrow revolving bands of the same color on the middle and lower part.

Length, 20 mill.

Hab. unknown.

The above is the description of *N. tincturata*, Reeve, which, in the Index to the "Iconica," is said to be a synonym of the smaller, obscurely figured *N. pulicaris*.

N. CINCTA, Recluz. Pl. 3, fig. 40.

Shell white covered by numerous chestnut punctations, with four narrow white bands spotted with brown. Length, 17 mill.

Malabar.

I am not acquainted with this species—which appears to me to be nearly related to the preceding. It is omitted from the monographs of Philippi, Reeve and Sowerby.

N. VIOLACEA, Sowb. Pl. 3, fig. 41.

Thick, smooth, polished; white, tessellated with obliquely square orange-brown spots, arranged in revolving series, sometimes promiscuously interrupted or broken up into hieroglyphic markings; columella with a heavy violet-colored callous deposit, covering the upper portion of the umbilicus. Height, 1 inch.

Philippines, Viti Islands.

This is *N. rhodostoma*, Phil.

N. FABELLA, Jousseaume. Pl. 3, fig. 42.

Ovately conoidal, solid; yellowish with minute chestnut dots and a sutural series of maculations; aperture white within, bifasciate with chestnut maculations, the margin minutely chestnut dotted; umbilicus narrow, largely covered by the thick brownish columellar callus. Length, 13 mill.

Hab. unknown.

Appears to be *very* closely related to *N. lynx*, Phil.

N. TECTA, Adanson. Pl. 3, fig. 43.

Ovately conoidal, solid, smooth, shining; yellowish, with short longitudinal chestnut lines at the suture, the rest of the surface minutely punctate with chestnut; umbilicus covered by the white columellar callus. Height, 18 mill.

Guinea.

N. SAGRAIANA, d'Orb. Pl. 3, figs. 44–46.

Whitish, with light chestnut, narrow zigzag lines, interrupted by a white band on the periphery; columellar callus chestnut or violaceous, nearly covering the umbilicus. Length, 5–7·5 inches.

West Indies, *Madeira*, *W. Africa*, *Mediterranean Sea.*

N. fulminea, Risso, name preoccupied by Gmelin for another species; ? *N. flammulata*, Requien; *N. pulchella*, Pfeiffer (fig. 46); *N. nivea*, Anton; *N. Jamaicensis*, C. B. Adams; *N. filosa*, Phil. (fig. 45), described as *lineolata*, preoccupied by Deshayes for a fossil species, are synonyms.

N. VENUSTULA, Phil. Pl. 3, figs. 47–49.

Shell shining, white with sparse chestnut lineations, somewhat zigzag, interrupted by a white band at the suture and a broader one on the periphery; columellar callus white, filling the umbilicus except a narrow chink. Length, 8 mill.

Habitat unknown.

The lines are not so close as in the last species, the sutural area is without them, the callus is uncolored and more nearly fills the umbilicus; still, I doubt its distinctness. *N. Bayani*, Jouss. (fig. 49), is apparently a synonym.

N. TRAILLII, Reeve. Pl. 3, fig. 50.

Rather solid, somewhat depressed globose, umbilicus large, partly filled by the brownish columellar callus; whitish, painted throughout with waved oblique dark chestnut lines.

Length, 12 mill.

Malacca.

More depressed than *N. Sagraiana*, the lineations wider apart, not interrupted by any peripheral band, etc.

N. MOZAICA, Sowb. Pl. 3, figs. 51, 52.

Ovate, whitish with four series of ovate, obliquely quadrate chestnut markings; columellar callus wide, white, covering the umbilicus. Length, 15 mill.

Hab. unknown.

The form and callus remind one of the smaller species of Neritina.

N. Chinensis, Lam. Pl. 3, figs. 53, 54.

Umbilicus wide, nearly filled by a wide central entering white callus, leaving a semicircular groove terminating in a narrow deep perforation above; white, with obliquely subquadrate chocolate-colored spots, arranged in four or usually five revolving series, the second and fourth series often conspicuously larger. Length, 1 inch.

China, *Singapore*, *Philippines*, *Viti Islands*.

This is *N. onca*, Bolten, of Adams' Genera, and *N. Aimei*, Jousseaume (fig. 54).

N. Forskalii, Chemn. Pl. 3, fig. 55.

Openly perspectively umbilicated, plicately striate next the suture; white, longitudinally strigate with chestnut, the strigations interrupted, forming two narrow white bands, base uncolored. Length, 1–1·5 inches.

Mauritius.

Has been considered by some conchologists a var. of *N. rufa*, Born, but the latter is unicolored, interrupted by bands and at the base, and the umbilicus has a distinct entering ridge.

N. Maheensis, Dufo. Pl. 3, fig. 56.

Strongly plicately wrinkled next the suture; umbilicus half filled with a strong white central entering callus; whitish, with two broad bands of oblique chestnut blotches. Length, 28 mill.

Seychelles Is.

N. Raynoldiana, Recluz. Pl. 3, fig. 57.

Rather thick, smooth, umbilicus partly covered on the upper part by the white columellar callus; orange-fulvous, sometimes unicolored, more frequently more or less covered by chocolate reticulations, often with an irregular band-like interruption on the periphery. Length, 1 inch.

Ceylon, *Singapore*, *Viti Is.*

Sowerby's figure is of a shape not characteristic of this species, the spire being too elevated.

N. canrena, Linn. Pl. 4, figs. 58–61.

Umbilicus largely filled with a white entering callus, leaving a semicircular rimation; chestnut-brown, with yellowish brown revolving zones, and longitudinal zigzag brown streaks, becom-

ing darker and much more prominent upon the pale bands, base white.

West Indies, *Central America*, *Florida*.

The young of this species has been described under the name of *N. proxima*, C. B. Ad. (fig. 59). *N. lemniscata*, Phil. (fig. 60), and *N. affinis*, Busch (fig. 61), appear to me to be merely young, faded-out examples of this species, although the first has been identified somewhat doubtfully with a West African shell (Jahrb. Mal. Gesell., iii, 244). Another synonym is *N. pennata*, Schroter.

N. ALA-PAPILIONIS (Chemn. in part), Auct. Pl. 4, figs. 62–67.

Slightly flattened at the suture, umbilicus large, with a central entering callous ridge; fleshy fawn-colored, with three or four subequidistant narrow white zones filleted with chocolate, the interspaces of the first and second and of the third and fourth zones usually darker colored. Length, 25–35 mill.

China, *Philippines*, *Australia*, *Seychelles*, *Zanzibar*, *Guaymas* and *Cape St. Lucas*, *W. Coast of Mexico*.

The above remarkable distribution is fully confirmed by specimens before me. The West Coast shells are known under the name of *N. zonaria*, Lam., but Carpenter acknowledges their identity. *N. crenata*, Recluz (fig. 63), *N. articulata*, Phil. (fig. 64), and *N. tæniata*, Menke, are synonyms.

Var. BRODERIPIANA, Recluz. Figs. 65–67.

Whorls longitudinally plicately grooved; orange-fawn color, with three white bands articulated with chestnut.

West Columbia, *Mazatlan*.

N. Taslei, Recl. (fig. 66), and *N. iostoma*, Menke (fig. 67), are synonyms of this variety. The latter has been differently identified, with *N. marochiensis*, Gmel., but Philippi's figure of the original type sets this question at rest.

N. PICTA, Recluz. Pl. 4, figs. 68, 69.

Umbilicated, the umbilicus mostly filled by a white entering callus, smooth; orange fawn-colored, white at the suture and base, covered with longitudinal short zigzag chestnut lines, and two or three subequidistant narrow or broader white bands sagittately marked with chestnut; the spaces between these

bands sometimes plain orange-fawn, or indistinctly or less distinctly marked with the zigzag lines. Length, 1 inch.

Philippines, So. Australia, N. Caledonia.

N. elegans and *N. euzona*, Recluz, and *N. decora*, Phil., are synonyms.

N. ZELANDICA, Quoy. Pl. 4, fig. 70.

Smooth, umbilicus with a central white entering callus; yellowish fawn-colored, with five white bands painted with chestnut-colored arrow-headed markings, and a similarly colored wider sutural band. Length, 22 mill.

New Zealand.

N. CATENATA, Philippi. Pl. 4, figs. 71–73.

Wrinkled-plicate around the suture, umbilicus large, with a central entering callus, below which it is wide but shallow, whorls more obliquely flattened than in the preceding species, brown fawn-color, white around the base, with three prominent narrow white bands painted with sagittate chestnut markings; an indistinct additional band often appearing between the second and third; interior violaceous white. Length, 18 mill.

Panama to *Cape St. Lucas, L. Cal.*

Allied to *N. Zelandica* on the one side and to *N. marochiensis* on the other. Reeve and Sowerby have confounded it with the latter and made it a Mediterranean species; Reeve's figure 92 *a*, however, represents the species correctly. *N. depressa*, Gray, = *N. Grayi*, Phil. (fig. 73), is a synonym. Gray's name was preoccupied by Sowerby for a fossil species.

N. MAROCHIENSIS, Gmelin. Pl. 5, figs. 74–96; Pl. 7, fig. 36; Pl. 8, fig. 49.

Slightly plicate at the suture, umbilicus largely filled by an entering white callus; color variable, grayish, yellowish gray, yellowish brown, or reddish brown, with about four bands of arrow-head markings, often running together or more or less obscured. Length, ·75–1·5 inches.

W. Africa, W. Indies, Panama to *Mazatlan, Society* and *Philippine Islands, Australia*, etc.

An exceedingly variable species, with very extended distribution. It is not the *N. marochiensis*, of Lamarck, which is Mediterranean, where the present species does not occur. It is

equally well known as *N. maroccana*, Chemn. The typical condition of the species is represented by figs. 74, 75. This form inhabits W. Africa, West Indies, Panama, Polynesia, etc.

N. Cayennensis (fig. 80), *N. sagittifera* (fig. 36), and *N. Souleyetiana* (fig. 81), of Recluz, *N. undulata*, Pease MS., and probably *N. Manceli*, Jouss. (fig. 82), and *N. undata*, Phil. (fig. 88), are synonyms. Very probably *N. Gualteriana*, Petit (Pl. 8, fig. 49), belongs here; it resembles *N. tessellata*, Phil., quoted below.

Var. LURIDA, Phil. Figs. 76, 77, 79, 83, 84.

Yellowish green or whitish, the bands obscure, with faint chestnut lines crossing them instead of the sagittate markings, suture plicate.

N. tessellata (fig. 79) and *N. hebræa*, Phil., include specimens with the color lines more distinctly marked. Occurs mainly in Central Polynesia, Sandwich Islands, etc., but also in West Indies and W. Africa.

N. plicatula, Nuttall MS., is a synonym, but the figure given by Reeve does not represent it, but more probably *N. sordida*, Phil. *N. Mahéensis*, Dufo, which I have described on p. 20, may possibly be a large aberrant form of this variety. *N. limacina* (fig. 83) and *N. Marchei* (fig. 84), Jouss., belong here.

Var. LIVIDA, Pfeiffer. Figs. 85–87, 89–92.

Plicate at the suture; whitish or yellowish white, often with a broad band of ash-color or brown, almost covering the body-whorl, sometimes indistinctly doubly banded; interior of aperture more or less tinted with chestnut or chocolate, the columellar callus chocolate-colored.

West Indies to Brazil.

Closely allied to the preceding variety, but distinguished by its colored callus; it is also usually smaller. *N. rufilabris*, Reeve (fig. 86), *N. lacernula*, Orb. (fig. 87), *N. Jamaicensis*, (fig. 89), *N. gracilis*, Sowb. (fig. 90), and *N. nigrescens*, C. B. Ad., are synonyms. *N. Menkeana*, Phil. (figs. 91, 92), is referred here by Mörch; it can scarcely be determined with confidence.

Var. UNIFASCIATA, Lam. Fig. 93.

Yellowish brown, chocolate or olivaceous, whitish towards the

base, with a more or less distinct narrow yellowish white band on the upper part of the whorls; interior chocolate tinged, callus white.

Panama, etc.

Large sized like the *Var. Chemnitzii*, into which it passes. *N. mustelina*, Swains., may be a water-worn specimen of this variety; it has not been recognized as a species.

Var. CHEMNITZII, Pfr. Figs. 94–96.

Grayish blue or grayish yellow, with four or five rather indistinct bands of sagittate markings either light chocolate or whitish, often connected by lightning-like whitish longitudinal streaks; interior dark chocolate, banded. Large sized.

Panama to Mazatlan and W. Africa.

N. Pritchardi, Forbes (fig. 94), is a synonym of this variety, as is also possibly *N. Cernica*, Jouss. (fig. 96), from Mauritius.

N. INSECTA, Jousseaume. Pl. 6, figs. 98, 99.

Shell thick, solid; whitish, with a central yellow band, and a few longitudinal flexuous chestnut stripes above and below it; umbilicus with a slight central entering callus. Length, 8 mill.

Hab. unknown.

Possibly a variety of the preceding species.

N. LINEOZONA, Jousseaume. Pl. 5, fig. 97; Pl. 6, figs. 100, 1.

Umbilicus open, with a small entering callus; white, with four equidistant spiral chestnut lines, and longitudinal chestnut flammules extending from the suture to the second revolving line, interrupted between the second and third, and again extending from third to fourth. Length, 9 mill.

New Caledonia.

N. Gaidei, Souverbie (fig. 100), and *N. notata*, Sowb. (fig. 1), are synonyms.

N. LOCELLUS, Reeve. Pl. 6, fig. 2, enlarged.

Livid flesh-tinged, fulvous brown, obscurely filleted and stained; columella thinly callous; umbilicus partly filled.

Habitat unknown.

Is possibly a variety of *N. marochiensis*, Gmel.

N. ASELLUS, Reeve. Pl. 6, figs. 3, 4, considerably enlarged.

Whorls faintly plicately striated at the suture, columella

covered by a broad callosity; whitish, with two broad chocolate bands and a row of spots between them.

Australia.

N. DILLWYNI, Payr. Pl. 6, figs. 5, 8; Pl. 5, fig. 78.

Yellowish or fawn-white, with white bands bearing obscure arrow-head markings of light chestnut; umbilical region whitish, partly filled by a callus.

Mediterranean Sea.

The original figure (fig. 8) represents an obscurely colored state of this species. *N. avellana*, Phil. (fig. 78) is a nut-brown variety, the bands obsolete. The late Dr. J. Gwyn Jeffreys considered *N. proxima*, C. B. Ad., a synonym.

N. AREOLATA, Recluz. Pl. 6, fig. 23.

Shell rather thin, polished; yellowish brown, with lighter zigzag markings; umbilicus with a large white entering callus. Length, 15 mill.

Australia, Philippines, Moluccas, Viti Is.

N. ABBREVIATA, Sowb. Pl. 6, figs. 6, 7.

Livid, bifasciately maculated, white-banded and slightly wrinkled at the suture; umbilicus closed by the callus; aperture chestnut within. Length, 12 mill.

? Mediterranean Sea.

Possibly a form of one of the well-known European species; only known to me by Sowerby's figures.

N. MARMORATA, H. Adams. Pl. 6, fig. 9.

Whitish, marbled with chestnut and somewhat flammulate at the suture, a lighter marbled band on the periphery; umbilicus partly reduced by the superior callus; columellar callus and interior tinged with chestnut. Length, 16 mill.

Canary Islands, Mediterranean.

It is *N. Pretoi*, Hidalgo.

N. VITTATA, Gmelin. Pl. 6, figs. 10–12.

Yellowish brown, vittate with chestnut, or laciniated; umbilicus with a central entering ridge. Length, 20 mill.

Morocco, Algiers, So. Coast of Spain.

N. textilis, Reeve (fig. 12), and *N. intricatoides*, Hidalgo, are synonyms.

N. FORATA, Reeve. Pl. 6, fig. 22.

Shell depressed globose, resembling a Turbo; umbilicus large, with flattened walls forming an angle with the base of the shell, and with a central thread-like entering-ridge; aperture semicircular, the inner lip straight and mostly detached, bounding the umbilicus; yellowish white, reticulated and spotted in revolving series with orange-brown. Length, 15 mill.

Cape of Good Hope.

N. LIMPIDA, E. A. Smith. Pl. 6, fig. 24.

Rather thin, semitransparent, whitish, glossy, opaque white at the suture; umbilicus rather narrow, without any internal ridge. Length, 8 mill. *Torres Straits, Australia.*

No operculum obtained. Is probably a young shell, and certainly possesses no characters to entitle it to description as a new species.

N. ANTONI, Phil. Pl. 6, fig. 25.

Smooth, plicatulate at the suture; olivaceous brown, with two spiral series of brown dots, whitish towards the base; umbilicus entirely filled with callus. Length, 14 mill.

Loo Choo Islands (Phil.); *Mouth of Macusi Riv., E. Africa* (Smith).

Mr. Smith remarks that a young specimen had a pale band between the two series of dots—which become obsolete in the adult.

N. COLLIEI, Recluz. Pl. 7, figs. 34, 30–33.

Obsoletely plicate at the suture; yellowish, with oblique, squarish chestnut markings in four spiral series, the two middle series sometimes confluent; umbilicus with a central rounded entering callus. Length, 19 mill. *Australia, Japan.*

N. concinna, Dunker (figs. 30, 31) and *N. bicincta*, Schrenck (figs. 32, 33) are only color-varieties of this species.

N. RUBROMACULATA, Smith. Pl. 7, fig. 35.

With a band of chestnut-colored maculations above, and another near the base, the spots connected by longitudinal flexuous lines; margin of aperture maculate within; umbilicus narrow, with entering callus. Length, 17 mill.

Whydah, W. Africa.

N. VARIABILIS, Recluz. Pl. 7, fig. 57.

Smooth, shining, rather solid; yellowish white, covered with a fine network of chestnut color, with a row of maculations near the base, and an opaque white band overlaid with the reticulations at the suture; columellar callus tinged with deep chestnut, and nearly filling the umbilicus. Length, 22 mill.

Hab. unknown (Reeve); *W. Africa* (Marrat).

Seems to be nearly related to *N. imperforata*, Gray.

N. PAVIMENTUM, Recluz. Pl. 7, figs. 38, 39.

Yellowish white, with orange-brown flexuous markings or spots, interrupted on the periphery by a broad light-bluish band, on the middle of which is a spiral series of orange-brown squarish spots; columella filled with callus. Length, 10 mill.

Philippines, Amboina.

N. Cailliaudi, Recluz (fig. 39) is a mere variety of this species.

N. PYGMÆA, Phil. Pl. 7, fig. 40.

Whitish, covered by small chestnut-colored punctations, with three obscure bands; umbilicus narrow, open. Length, 10 mill.

Cape of Good Hope.

N. DILECTA, Gould. Pl. 7, fig. 41.

Covered with a russet-colored epidermis, under which the shell is ivory-white, reticulated with a very minute network of rusty brown or fawn-color, leaving occasional white patches, and with a series of chestnut-colored blotches, revolving on all the whorls, near the suture; callus tinged with chestnut-brown, nearly filling the umbilicus. Length, 16 mill.

? Mouth of the Rio Negro, Patagonia.

N. ADAMSIANA, Dunker. Pl. 8, fig. 46.

Olivaceous brown, with two lighter bands covered with longitudinal flexuous chestnut markings; umbilicus with central entering callus; suture slightly plicate; interior of aperture chestnut colored with two pale bands. Length, 23 mill.

Japan.

N. MOQUINIANA, Recluz. Pl. 8, figs. 47, 48.

Rather thin; yellowish brown, with three series of chestnut maculations, running together in adult specimens, with connect-

ing longitudinal stripes; callus slight, partly covering the umbilicus from above. Length, 16 mill.

Hab. unknown.

M. Recluz is of opinion that the operculum will prove to be corneous.

N. LIMBATA, d'Orb. Pl. 8, fig. 50.

Thin, smooth, reddish or light purplish, white around the base, and white lined at the suture; umbilicus narrow.

Length, 16 mill.

Bay of San Blas and *Mouth of Rio Negro, Patagonia.*

I am not acquainted with either this or the following species.

N. ISABELLEANA, d'Orb. Pl. 8, fig. 51.

Reddish brown, smooth, thin; umbilicus narrow.

Length, 13 mill.

Maldonado, Uruguay.

Philippi remarks that the specimen figured and described by d'Orbigny is probably worn and has lost some of its markings, as he had seen a Brazilian shell, with four bands, and longitudinal flames which might well be referred to this species.

N. COLLARIA, Lam. Pl. 8, figs. 54, 52, 53, 49.

Whitish, with irregular, interrupted chestnut streaks, not extending to the base, slightly flattened at the suture, and milk-white, bearing fewer, larger sagittate chestnut markings; umbilicus with somewhat inferior entering callus; interior tinged with chestnut. Length, 1–1·25 inches.

W. Africa.

N. labrella, Lam.; *N. Gambiæ*, Recluz (fig. 53), an old thickened example; and *N. obstructa*, Menke (fig. 49 bis) a faded specimen, are synonyms. One of the figures of *labrella* given by Philippi in Küster (fig. 52) also represents an individual denuded of color markings.

N. ELENÆ, Recluz. Pl. 8, figs. 55, 56.

Depressed, inflated, spire small, suture well impressed, closely plicately ridged above and below between the growth grooves, the middle of the body-whorl with incised growth lines only; umbilicus very large, with an inferior entering callus; whitish,

densely lineated with chestnut, the markings dislocated in three spiral series. Length, 1–1·5 inches.

Panama.

Closely allied to the next species in general pattern of coloring only.

N. Haneti, Recluz (fig. 56), and *N. excavata*, Carp., are synonyms.

N. LINEATA, Lam. Pl. 8, fig. 57.

Shell smooth, rather largely umbilicated, with inferior entering callus; white, flexuously lineated with chestnut, except at the base. Length, 1–2 inches.

Singapore, Philippines.

N. BURIASENSIS, Recluz. Pl. 8, fig. 58.

Whorls somewhat slanting above, convex below, smooth, polished; bluish white; with longitudinal flexuous chestnut lineations; deeply umbilicated; columella with a broadly reflected deep red columellar callosity. Length, 13 mill.

Isle of Burias, Philippines.

N. GRACILIS, Recluz. Pl. 8, fig. 59.

Whorls more convex and spire more produced than in preceding species; whitish, with crowded oblique longitudinal lineations; umbilicus reniform, with a median entering callus. Length, 10 mill.

Philippines.

N. VITELLUS, Linn. Pl. 8, fig. 60.

Whorls slightly plicate at the suture; orange-brown, obscurely lighter banded, with an upper and a lower series of large white or yellowish spots; umbilicus deep, partly circumscribed by a superior callus. Length, 1·25–1·75 inches.

Philippines, Singapore.

N. ZONALIS, Recluz. Pl. 8, fig. 61.

Shell covered by a very thin brownish epidermis, beneath which it is whitish, with two bands of longitudinal, sometimes confluent chestnut lines; umbilicus with inferior entering callus. Length, 17 mill.

Viti Islands.

N. RUFA, Born. Pl. 9, figs. 62, 63.

Excavately umbilicated, with central entering callus, and overhanging superior callus; upper and middle portion of

whorls chestnut-color, with a narrow white sutural band, a white peripheral band, and the lower part of the body-whorl also white.

Length, 1·5 inches. *Hong Kong*, *Singapore*, *Mauritius*.

It is *N. fasciata*, Martyn, *N. leucozonias*, Gmel.

Var. SPADICEA, Gmelin. Fig. 63.

The coloring lighter and more diffused, often varying in intensity in obsolete bands and spiral lines, the sutural white band wider.

Var. FORSKALI, Chemn.

On p. 20 I have treated this as a distinct species; it has been regarded by some conchologists as a variety of *N. rufa* in which the coloring is interrupted by the growth-lines causing it to form longitudinal oblique stripes instead of being diffused over the entire surface. It is very possible that it has been correctly placed here.

N. HELVACEA, Lam. Pl. 9, fig. 64.

Whorls somewhat slanting above, then more convex; umbilicus deep, contracted above by the callus; a diffused white band at the suture, then a broad diluted chestnut band extending to below the periphery, base white; on the chestnut space, at the periphery is a narrow white band, above it generally another, obsolete. Length, 1·5 inches. *Singapore*.

Perhaps only a variety of the preceding species, which it decidedly resembles in coloration, differing mainly in the sloping conical form, and narrower umbilicus with the entering callus barely indicated. It is usually called *N. globosa*, Chemn., but this is only a portion of the descriptive phrase used by that author to designate the species. It is *N. spadicea*, var. β, of Dillw., and *N. pallens*, Phil.

N. CLAUSA, Brod. and Sowb. Pl. 9, figs. 65, 67–69, 73.

Shell globose, whitish or yellowish white, spire often tinged livid, umbilicus entirely covered and closed by a callus.

Length, 1·25–2 inches.

Arctic Seas—circumboreal, *N. Japan*, *Alaska*, *Melville Isl.*, *Greenland to Massachusetts*, *Arctic Europe*, *Off Coast of Portugal* (nearly 1000 fms.).

The late Dr. J. Gwyn Jeffreys identified this with *N. affinis*, Gmel. Mr. Verrill in reviewing Dr. Jeffrey's paper (Am. Jour. Sci., 3 ser., v, 472), dissents from this consolidation, because *Nerita affinis*, Gmel., is described as having a nacreous interior, as inhabiting New Zealand, and is placed in the umbilicated section of the genus. An inspection of the Syst. Nat. of Gmelin shows that in the last particular only is Verrill correct, no silvery interior is mentioned, the habitat is said to be northern seas and a reference is made to the Zool. Danica, prodr. of Müller. Still, the uncertainty of an unfigured species, insufficiently described, and the fact that it is, whether correctly or not, placed among umbilicated species, forbid the use of the name *affinis* for the species.

The synonyms are *N. consolidata*, Couth. (fig. 67), a southern and smaller form, occurring as far southward as Massachusetts; *N. septentrionalis*, Beck (fig. 69), Greenland; probably *N. russa*, Gould, Arctic Ocean; *N. operculata*, Jeffreys (fig. 73), Japan.

N. occlusa, S. Wood, a Crag fossil of England, has been referred to this species; I think it distinct, as the spire is much more elevated and the whorls more convex.

Var. VITTATA, Jeffreys.

Spire more elevated, body-whorl with two purplish bands, one of them showing on the penultimate whorl.

Greenland.

This will perhaps prove distinct; I should think it, from the description, more nearly allied to the fossil *N. occlusa*.

Var. IANTHOSTOMA, Desh. Fig. 68; Pl. 19, fig. 89.

Yellowish brown, irregularly white zoned, apex blackish; interior purplish. Length, 2 inches.

Kamtschatka, Northern Japan.

N. IMPERVIA, Phil. Pl. 9, fig. 66.

Oval, with spire very short, rather solid, white, umbilicus completely filled with callus. Length, 10 mill.

Straits of Magellan.

N. PUSILLA, Say. Pl. 21, fig. 6.

Cinereous, or yellowish white, with sometimes one or two obsolete bands; columella callous nearly closing the umbilicus,

and only leaving an arcuated linear opening; operculum calcareous. Length, 6 mill.

Southern Coast of the United States;
Buzzard's Bay, 3 to 8 fms. (Stimpson).

This is not *N. pusilla* of Reeve's "Iconica."

Section Stigmaulax, Mörch, 1852.

N. sulcata, Born. Pl. 9, fig. 75.

Largely umbilicated, partly filled by an inferior entering callus; cancellated by revolving and longitudinal close grooves, often pitted at their crossings; white, sometimes banded and mottled with fulvous orange. Length, 20 mill.

West Indies.

The revolving grooves are sometimes very faint, in other specimens as strong as the longitudinal ones. Other names for the species are *N. cancellata*, Gmelin, *N. rugosa*, Chemn., *N. costata*, Menke.

N. semisulcata, Gray. Pl. 9, fig. 74.

Deeply and rather widely umbilicated, umbilicus bounded by an angle, suture excavated, whorls slantingly flattened above; polished white, encircled superiorly by five or six linear grooves. Length, 14 mill.

West Indies.

Is possibly a Mamma. I do not know the operculum.

Subgenus Neverita, Risso, 1826.

Section Neverita (typical).

N. ampla, Phil. Pl. 10, figs. 81–83, 85, 86; Pl. 11, figs. 91–93; Pl. 12, fig. 6.

Depressed globose, indistinctly spirally engraved, a little depressed below the suture; umbilicus very wide, spirally striate, and usually two- or three-ridged, umbilical callus transversely deeply grooved in the middle, reflected over the upper portion of the umbilicus, rather small; color light flesh or yellowish brown, earlier whorls often livid, interior and callus light chocolate. Length, 2–2·5 inches.

Indian Ocean, China, Japan, Australia, Mauritius.

The numerous species here united have received from Sowerby

and others the name of *N. didyma*, Bolten (fig. 81), an author scarcely quotable; *N. vesicalis*, Phil. (fig. 92), has also been used in this connection; but *N. ampla* has priority of position, although published at the same time as *N. vesicalis*. Other synonyms are: *N. robusta*, Dkr., *N. Lamarckiana* (fig. 86), *N. Chemnitzii* (fig. 82), *N. Petiveriana* (fig. 91), and *N. intermedia* of Recluz; *N. problematica*, Reeve (fig. 93); *N. papyracea*, Busch (fig. 85); *N. bicolor*, Schrenck, not Phil.; *N. incisa*, Dkr., and perhaps *N. glaucina*, Lam., not Linn.

N. BICOLOR, Phil. Pl. 11, fig. 94.

Depressed orbicular, smooth, yellowish brown above, whitish beneath; umbilicus spirally striate, and few ridged, callus small, bipartite, chocolate-color; aperture dark chocolate above, whitish inferiorly. Length, 28 mill.

Chinese Sea, Japan.

Perhaps only a variety of the preceding species.

N. INCEI, Phil. Pl. 10, figs. 87–90; Pl. 11, fig. 95.

Yellowish-, brownish-, or livid-white, chocolate, etc.; depressed orbicular; umbilicus entirely filled with a button-like callus, the rounded margin of which is sometimes deeply grooved; aperture white, or tinged with chocolate. Length, 1–1·25 inches.

Southern Coast of Australia.

The synonyms are *N. Baconi* (fig. 95), and *N. fibula* (fig. 89) of Reeve, and *N. clavatà*, Sowb. (fig. 90).

N. JOSEPHINÆ, Risso. Pl. 10, fig. 84; Pl. 11, fig. 96.

Depressed globose, widely umbilicated, but the umbilicus mostly filled by the flattened callus; glaucous or yellowish brown above, usually lighter or whitish beneath, aperture chocolate-colored, white inferiorly. Length, 1 inch.

Southern Europe.

It is *N. glaucina* of Reeve and other authors (fig. 96), not of Linnæus or Lamarck; *N. olla*, Desh.; *N. Philippiana*, Recluz (fig. 84); *N. albumen*, Scacchi, etc.

N. DUPLICATA, Say. Pl. 12, figs. 3–5; Pl. 13, fig. 10.

More or less conically globose, obsoletely spirally engraved, and obliquely longitudinally striated, often with a slightly

depressed area beneath the suture; umbilicus wide, spirally striate, nearly filled by a wide, somewhat overhanging callus, which is often rugose or obsoletely pitted; gray, yellowish brown, livid, etc., callus and interior of aperture chocolate.

Length, 3 inches.

New England to *Florida*, *Gulf Shores of the United States*, etc.

The species figured by Reeve under this name is *Lunatia heros*, Say; Sowerby has also confounded the two species. *N. Delessertiana*, Recluz, combines the typical form with that described by Gould as *N. fossata* (fig. 4). The latter is scarcely entitled to even varietal rank; it is distinguished by the umbilicus being more decidedly striate and bounded by an acute ridge, but these features common, perhaps predominant in Florida specimens, seem to shade away with the more northern distribution. *N. Campeachiensis*, Recluz (fig. 10), and *N. Texasiana*, Phil. (fig. 5), are synonyms. The bowl-shaped sandy nidimental ribbon is a common and very curious sea-shore object; it is very different in form and structure from the capsules of other gastropod genera.

N. Recluziana, Desh. Pl. 12, fig. 1.

Shell solid, conically globose, columella strongly callous from the superior function of the outer lip, nearly filling the umbilicus; fawn-color, or yellowish brown, lighter or whitish below, interior chocolate, callus usually white. Length, 3 inches.

California, *N. W. Coast of Mexico.*

The figure is more than usually conical, the general form being somewhat more conical than in *N. duplicata.*

N. glauca, Humboldt. Pl. 11, figs. 97, 98.

Shell very much depressed, rugosely striate, concavely excavated beneath, the umbilicus partly overhung by a thin, tongue-like callus; whitish, or yellowish, broadly chestnut banded above, callus and interior chestnut-color.

L. 1·25, diam. 2·25 inches.

Acapulco to Panama.

It is *N. Bonplandi*, Val. and *N. patula*, Sowb. The latter name should perhaps have priority were it not preoccupied for a fossil species.

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N. LARVATA, Canefri. Pl. 23, fig. 64.

Smooth, very minutely decussately striate, subplicate at the suture; bluish white, with two indistinct chestnut bands; umbilicus entirely filled by a heavy white columellar callus; aperture chestnut-colored. Length, 18 mill.

Hab. unknown.

The operculum has not been observed, and the systematic position of the species is uncertain.

Section LUNATIA, Gray, 1847.

N. LEWISII, Gould. Pl. 13, figs. 11, 12; Pl. 9, fig. 70.

Conical globose, obsoletely spirally striate, yellowish white or brownish white; whorls obliquely sloping above with, in old specimens, an obtuse angle on the shoulder, defined by a slight concave constriction above and below it; interior chocolate-white; umbilicus narrow and deep, with a tongue-shaped, chocolate-tinged callus extended partly over it from above.

Length, 3–5 inches.

California, Oregon, etc., Japan.

The largest species of the genus. Small specimens are regularly rounded on the upper portion of the whorls; it is only with advancing age that the constriction gradually becomes more apparent. The species is generally known as *N. herculea*, Middendorff, but that name was published two years subsequently. *N. Reiniana*, Dunker (fig. 12), a Japanese species, is surely a synonym; and *N. algida*, Gould (fig. 70) is the young.

N. HEROS, Say. Pl. 13, figs. 13, 16; Pl. 14, figs. 19, 20.

Yellowish, or brownish white, with obsolete waved minute spiral striæ, interior flesh-color, columella only slightly callously thickened, flesh-color, scarcely contracting the narrow, deep umbilicus. Length, 3–4·5 inches.

Maine to New Jersey.

N. heros is a northern species, gradually replaced southwards by *N. duplicata*. The latter has been confounded with it by British authors. Like *N. duplicata*, it preys extensively on other mollusks; on the New Jersey coast *Mactra solidissima* is its usual victim, being grasped in the voluminous foot of the

Natica, whilst the tongue bores a circular hole through the shell near its beak. The egg-case, like that of *N. duplicata*, is a common sea-shore object.

N. triseriata, Say (fig. 16) is a color-variety of the young of this species; it has three spiral series of oblique, short chestnut streaks, under an olive-gray epidermis. In this state the species resembles some of the typical Naticas in coloration. As the shell grows larger the markings become more obscure, so that it is rare to find a specimen an inch in diameter in which any trace of them remains. In other young specimens there are never any markings at any stage of growth. *N. ampullaria*, Lam., referred by authors to several species, really appears to belong to this; but there seems to be no good reason for reviving it at this late day. *N. pomum*, Phil. (fig. 20) appears to be a synonym; its locality is unknown.

N. PAPYRACEA, Sowb. Pl. 13, fig. 14.

Shell thin, globose, yellowish white, obscurely two-banded, umbilicus narrow, interior of aperture and columella flesh-color.

Length, 1·4 inches.

Hab. unknown.

Said to resemble the European *Helix pomum*. It is probably the young of one of the preceding species—perhaps of *N. Lewisii*.

N. LEVICULA, Verrill. Pl. 13, fig. 17.

Shell thin and light, globose, with deeply impressed sutures, columellar lip nearly vertical, very slightly callously expanded above, so as to encroach somewhat on the narrow umbilicus.

Length, 40 mill.

Maine, Massachusetts; deep water.

Much thinner, with more rounded whorls and different columella than *N. heros*. It is very rare, and has only been obtained during recent years by dredging.

N. GLOBOSA, Jeffreys. Pl. 14, fig. 34.

Globular, thin and fragile, semitransparent, glossy, whitish, suture rather deep, umbilicus narrow. Length, 2·5 mill.

Morocco and *Cape Verd Is.* (Talisman Exped., 1192–1980 fms.).

I introduce this little species here, because of its remarkably suggestive resemblance to the preceding one, of which it may possibly be the young.

N. PATAGONICA, Phil. Pl. 14, fig. 24; Pl. 21, fig. 12.

Shell globose, solid, smooth, white, suture profound, umbilicus narrow. Length, 1·4 inches.

Straits of Magellan.

N. globosa, King (unfigured), from the same locality, appears to agree in description, except that it is said to be thin. Perhaps *N. Magellanica*, Phil. (fig. 12), may also be referred here.

N. ATROCYANEA, Phil. Pl. 14, fig. 21.

Ovately globose, rather thin, bluish or bluish-white, with a white band at the suture, and white also at the base; umbilicus narrow; interior and columella chocolate-colored.

Length, 1·5 inches.

Straits of Magellan.

N. FORTUNEI, Reeve. Pl. 14, figs. 22, 23; Pl. 9, fig. 72; Pl. 21, fig. 9.

Conically globose, with elevated spire and well-marked suture, umbilicus narrow, slightly contracted by callus above; yellowish white to brownish, interior tinged with chocolate.

Length, 42 mill.

China.

Reeve's example was a young one (fig. 22), and resembles *Natica tenuis*, Philippi (not Recluz), so closely (fig. 9), that I am inclined to consider that shell also identical; although it is said to be as thin as paper, whilst *Fortunei* is of medium thickness. The name *tenuis* was used at an earlier date by Recluz. Perhaps *N. gilva*, Phil. (fig. 72), is identical; if so, the name will take precedence.

N. PALLIDA, Brod. and Sowb. Pl. 14, figs. 27, 26, 28; Pl. 13, fig. 15; Pl. 9, figs. 76–78.

Ovately globose, narrowly umbilicated, smooth, dirty white under a yellowish brown thin epidermis. Length, 28 mill.

Arctic Seas—circumboreal; Maine, Massachusetts.

N. borealis, Gray (fig. 76); *N. alba*, Lovén; *N. pusilla*, Gould, Forbes and Hanley (not Say) (fig. 78); *N. Grœnlandica*, Beck (fig. 35); *N. lactea*, Lovén; *N. bulbosa*, Reeve (fig. 77), probably *N. Beverlii*, Leach; *N. Gouldii*, Phil. (fig. 15); *N. suturalis*, Gray (fig. 28); *N. livida*, Laskey; *N. caurina*, Gould (fig. 26), are synonyms.

N. SORDIDA, Phil. Pl. 12, figs. 99, 100.

Solid, striate longitudinally, reddish brown or orange-brown, or yellowish white, white at the base; umbilicus narrow, open, spirally striate, usually reddish brown as well as the callus; interior of aperture whitish or tinged with brown.

Length, 1·1 inches.

England to *Mediterranean*, rare.

With this must be united *N. Brocchiana*, Phil., *N. fusca*, of Weinkauff, not Blainville—the latter being a somewhat doubtful species, *N. lævida*, Laskey, and *N. plicatula*, Reeve (fig. 100).

N. COMPACTA, Jeffreys. Pl. 14, fig. 31.

Globular, thick, opaque, somewhat glossy, with a few microscopical spiral striæ; light yellowish brown; suture wide, slightly channeled; inner lip thickened, closing the umbilicus, but not by a pad. Length, 9 mill.

Atlantic, *O.* ("Porcupine" and "Lightning" Expeditions).

The young have the umbilicus open.

N. SUBPLICATA, Jeffreys. Pl. 14, fig. 32.

Globular, rather thick, opaque, glossy, slightly wrinkled—striate at the suture; ivory-white; suture rather deep; umbilicus narrow. Length, 10 mill.

Bay of Biscay, *Off Cape Verd Is.* (370–1192 fms.).

N. ANGULATA, Jeffreys. Pl. 14, fig. 33.

This is an embryo only, and should not have been described. Length, 1·25 mill.

Atlantic, *Mediterranean* ("Porcupine" Exped.).

N. TENUIS, Recluz. Pl. 14, fig. 25.

Thin, dirty white, smooth, spire elevated, suture well impressed, columellar callus thin, reducing the umbilicus to a rimate opening. Length, 1 inch.

Valparaiso.

N. IMMACULATA, Totten. Pl. 12, fig. 7.

Conically ovate, the extremities rather pointed, milk-white, under a thin greenish yellow epidermis; umbilicus narrow; inner lip with white callus. Length, 8 mill.

New England, *Nova Scotia*, etc., to *Greenland.*

With this I unite *N. nana*, Möller, a species described from Greenland.

N. PISIFORMIS, Recluz. Pl. 12, fig. 8.

Narrowly umbilicated, white, columella with a white callus above; rather solid, whorls somewhat flattened above.

Length, 5–6 mill.

Valparaiso, Chili.

I know nothing of this species.

N. NUCULA, Reeve. Pl. 12, fig. 9; Pl. 9, fig. 80.

Subglobose, body-whorl obliquely flattened or subconstricted around the middle; columella with a broad, button-like callosity completely covering the umbilicus; dull yellowish white, livid at the apex.

New Ireland.

The figure is said to be "considerably magnified," but no dimensions are given.

N. OBTUSA, Jeffreys. Pl. 9, fig. 79.

Conically globose, rather thick, opaque and glossy, whitish, inner lip callous, completely covering the umbilicus.

Length, 7·5 mill.

N. Atlantic Ocean.

Closely resembling *N. immaculata*, Totten in form, but distinguished by its closed umbilicus.

N. SOLUTA, Gould. Pl. 9, fig. 71.

Shell small, thin, globular, whorls slightly tabulated above, suture channeled; umbilicus deep, narrow, columella somewhat callous above; color whitish. Length, 13 mill.

? Southern Coast of South America.

The locality is very doubtful. It does not appear to differ much from *N. pallida*, Brod. and Sowb., and P. P. Carpenter is probably correct in referring it to that species.

N. MONTAGUI, Forbes. Pl. 14, fig. 30.

Yellowish or rufous white, smooth, suture narrowly channeled, umbilicus moderate, with a nearly obsolete entering callus.

Length, 10 mill.

Iceland, England, Norway.

It is *N. rufa*, Montagu; *N. helicina*, Saguenza (in part); *N. albula*, Marshall, and *N. squalida* and *N. rutila* of Macgillivray.

N. NOTABILIS, Jeffreys. Pl. 13, fig. 18.

Somewhat pointed at the extremities, thick, smooth, opaque, rather glossy; yellowish white, with three equidistant bands on the body-whorl, composed of oblique, close, reddish brown streaks; umbilicus contracted by a thick but small chestnut-blotched pad, so as to form a concentric groove.

Length, 10 mill.

Off Sagres, Portugal.

Like *N. triseriata* in coloring, but the whorls are not so ventricose, spire more pointed, and umbilicus different; it differs also from *N. macilenta* in shape, consistency, color and umbilicus.

N. MACILENTA, Phil. Pl. 6, figs. 17–19.

Shell conic-ovate, smooth, spire rather elevated, openly umbilicated; yellowish white, four-banded with oblique chestnut streaks, columellar callus chestnut-tinged. Length, 12–15 mill.

Mediterranean, Atlantic Coast of Spain and N. Africa.

N. pulchella, Risso, is probably the same species, and *N. Rizzæ*, Phil. (fig. 19), is a slight color-variety. It is very doubtful whether this species is distinct from *N. Guillemini*, Payr., differing only in its smaller size and more oval shape.

N. GUILLEMINI, Payr. Pl. 6, figs. 16, 14, 26.

Narrowly umbilicated, conically globose; purplish white, marbled or obscurely five-banded with chestnut blotches, which are more distinct and irregular around the suture, columellar callus tinged with chestnut. Length, 18–22 mill.

Southern Europe, Atlantic and Mediterranean.

N. marmorata, Risso, and *N. maroccana*, Salis, are synonyms. See remarks under preceding species. *N. Franciscana*, Recluz (fig. 26), is a variety.

N. ALDERI, Forbes. Pl. 6, figs. 13, 15.

Obliquely rounded above, subglobose; whitish, usually with five bands of chestnut-colored markings, the three lower ones sagittate; umbilicus open, narrow, the columellar callus chestnut-tinted, slightly impinging above. Length, 12–15 mill.

Northern Europe to Mediterranean Sea.

This is *N. nitida*, Forbes and Hanley (fig. 15), not Donovan,

N. marochiensis, Phil., not Chemnitz; perhaps *N. glaucina*, Linn., in part, *N. macilenta*, Reeve (fig. 13), not Phil., and *N. lactea*, Marshall, *N. intermedia*, Phil., *N. Poliana*, Chiaje, etc.

N. CATENA, DaCosta. Pl. 7, figs. 42–45.

Shell yellowish brown, with a single band of very short flexuous chestnut markings or spots at the suture; umbilicus open, rather narrow, partly restricted above by the callus.

Length, 1·5–2 inches.

Europe.

Better known under the later name of *N. monilifera*, Lam.; but it is doubtful whether this species has been properly identified; it is certainly the *N. monilifera* of most authors.

The animal is yellowish or drab, with a purplish tinge on the upper part, and faintly lineated with brown. The fry are globular, orange-colored and umbilicated; they assume the purplish brown markings after they are excluded from the leathery band (fig. 44).

According to Bouchard-Chantereaux the sexual coition lasts many hours. The spawn-envelope consists of a great number of rounded cells, each containing from 12 to 15 fry, which emerge in succession at an interval of two or three days after at least two months of fœtal life. The eggs are laid usually in March and April, and the young are produced in May or June. "When just taken, in vigor, and immersed in sea-water, it is scarcely possible to contemplate a more beautiful and interesting object, with its shell rising as a globular pyramid from its immense circular disk, elegantly marked with fine dark lines on clear drab ground."—CLARK.

It is *N. canrena*, Maton and Rackett, *N. castanea*, Lam., *N. Nicolii*, Forbes, *N. helicina*, Brocchi, *N. glaucina*, Fleming and Pennant. *N. ampullaria*, Lam., has been referred to this species, but the figure of it given by Delessert is more like *N. heros*, Say. The brown variety called *castanea* by Lamarck, has since been rechristened Var. *Leckenbyi*, Marshall.

N. LARGILLIERTI, Recluz. Pl. 14, fig. 29.

Yellowish brown, rather smooth, inflated, umbilicus narrow, reduced to a mere slit by the reflected callus.

Length, 32–45 mill. *Newfoundland.*

Believed to have been obtained from the stomach of codfish. If the original figure is correct, this species appears to have escaped all other collectors.

Section PAYRAUDEAUTIA, Bucq., Dautz. & Dollf., 1883.

N. INTRICATA, Donovan. Pl. 6, figs. 20, 21.

Largely excavated umbilicated, with two funicular ridges; purple-white, with five or six white bands bearing angular or sagittate chestnut markings, interior chocolate-tinged.

Length, 15–22 mill.

Azores, Southern Europe, Mediterranean Sea.

N. fasciata, Risso, *N. grisea*, Requien, *N. Valenciennesii*, Payr., are synonyms.

Section MAMMA, Klein, 1753.

N. DEIODOSA, Reeve. Pl. 15, fig. 36.

Depressed ovate, spire minute, body-whorl flattened beneath, the umbilicus filled by a heavy white callus; whorls smooth, striate, pale straw-color. Length, 1·75 inches.

Australia.

Differs in form and umbilicus from *N. aurantia*, Lam.

N. AURANTIA, Lam. Pl. 15, figs. 39–41, 37.

Thick, ponderous, body-whorl conically sloping above and a little constricted in old specimens; orange-brown; callus heavy, ivory-white, in adults usually entirely filling the umbilicus.

Length, 2 inches.

Singapore, Moluccas, Philippines, Australia, N. Caledonia.

Var. MITTREI, Hombr. and Jacq. (fig. 37), is a specimen in which the umbilicus is not entirely filled by callus; *N. citrina*, Phil. (fig. 41), appears to be a similar form.

Var. STRAMINEA, Recluz. Fig. 40.

Color straw-yellow, varying to yellowish white.

N. POWISIANA, Recluz. Pl. 15, fig. 42; Pl. 19, fig. 92; Pl. 20, figs. 99, 100.

Openly obliquely umbilicated, columellar lip with a heavy white callus overhanging a central broad entering funiculum; whitish or yellowish white, usually overlaid on the body-whorl,

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except near the suture and at the base with orange-brown, the latter sometimes evanescent in places, or obscurely banded.

Length, 1·75–2·25 inches.

China, *Moluccas*.

N. Cumingiana, Recluz (fig. 99), and ? *N. pallium*, Recluz, and *N. Draparnaudi*, Recluz (fig. 100), are synonyms. *N. effusa*, Swains. (fig. 92), is probably a pale-colored variety.

N. RAVIDA, Souleyet. Pl. 15, fig. 38.

Deeply perspectively umbilicated, globose, very solid, body-whorl slightly obliquely flattened above; white, covered with a thin, rough, horny yellowish epidermis, columellar callus very strong, white. Length, 28 mill.

Payta, *Peru* (Souleyet); *St. Elena*, *W. Columbia* (Cuming).

N. ORIENTALIS, Gmelin. Pl. 20, figs. 1, 2.

Widely globose, plicate at the deep suture; umbilicus broad, with a white central entering callus, aperture produced below; orange-brown, varying to yellowish white.

Length, 1·5–1·75 inches.

Singapore.

It is *N. eburnea*, Desh., *N. subfulva*, Chemn.

N. MAMILLARIS, Lam. Pl. 18, fig. 74.

Conic ovate, deeply umbilicated, with a broad entering callus, flesh-brown or orange-brown, base and columellar callus white.

Length, 2 inches.

West Indies, *Caribbean coasts of Central and South America*, *Bahia*, *Brazil*.

It is *N. brunnea*, Linck, and *N. Bahiensis*, Recluz. *N. pallium* of the latter author (p. 42), which I have made a doubtful synonym of *N. Powisiana*, may belong here; it closely resembles the present species, but the locality differs widely.

N. OTIS, Brod. and Sowb. Pl. 17, figs. 72, 70, 71; Pl. 19, fig. 91; Pl. 12, fig. 2.

Conic ovate, yellowish white or light mouse-color, with a yellowish or orange band at the suture; umbilicus open, chestnut-brown, together with the central entering callus; interior of aperture chestnut-color. Length, 1–1·75 inches.

Gallapagos Is. to *Cape St. Lucas*, *L. Cal.*

N. Gallapagosa (fig. 71); *N. perspicua* (fig. 91); *N. Salangoensis* (fig. 70) of Recluz, and Var. *fusca*, Carpenter (fig. 2), are synonyms.

N. BIFASCIATA, Gray. Pl. 18, fig. 75.

Light fawn-brown, white next the suture and around the umbilicus, with two narrow white bands; umbilicus narrow, chestnut-brown, partly covered above with the brown-tinged columellar callus; interior light flesh- or chocolate-brown, showing the bands.

Length, 1·25–1·75 inches.

Acapulco, Guaymas, Cape St. Lucas, L. Calif.

N. SUFFUSA, Reeve. Pl. 19, fig. 87.

Conic ovate, solid, smooth, transparent white, here and there opaque, tinged with violet towards the apex; columellar callosity violet, nearly covering the umbilicus. Length, 12 mill.

New Ireland.

Is probably a variety only of *N. mamilla;* but I have not seen the species.

N. CONICA, Lam. Pl. 18, figs. 76, 77.

Elongated conical-ovate, a little compressed and whitish or orange-tinted at the suture; balance of shell fulvous ash-color, fading to white at the base; columellar callus heavy, almost filling the umbilicus—which, with the callus, is more or less tinged with chestnut-color. Length, 1·25–1·75 inches.

So. Australia.

N. ustulata, Sowb. (fig. 77) appears to be only a slight variety.

N. PYRAMIS, Reeve. Pl. 17, fig. 68.

Solid, conical ovate, whitish or yellowish-white; columellar callus thick, white, partly covering the narrow umbilicus.

Length, 28 mill.

Australia.

I think this will prove to be an uncolored form of the preceding species.

N. PLUMBEA, Lam. Pl. 18, figs. 78, 79; Pl. 19, fig. 88.

Conically ovate, rather solid, growth striæ ruguse at the suture; leaden gray, lighter or orange-banded at the suture; umbilicus

moderate and, with the columellar callus tinted with orange-brown; interior chestnut-colored. Length, 1·5–2 inches.

Australia, New Zealand.

The form is less conical, the color deeper, the umbilicus more open than in *N. conica.*

N. microstoma, Quoy (fig. 79), is probably a synonym, and *N. sordida*, Swainson, certainly is. I figure a form called by Gray *N. sordida*, var. globosa (fig. 88).

N. LEUCOPHÆA, Reeve. Pl. 18, figs. 82, 80.

Differs from *N. plumbea* only in its more globose form, and more open umbilicus; coloring similar. Length, 1·25 inches.

Australia.

Probably only a variety of *N. plumbea.* *N. Strangei*, Reeve (fig. 80), appears to be identical.

N. MELASTOMA, Swainson. Pl. 18, fig. 81; Pl. 19, fig. 90; Pl. 21, fig. 8.

Obliquely ovate, slightly concave at the suture; olivaceous, with a whitish sutural space bearing an indistinct darker band; umbilicus widely excavated, and filled up with a heavy chestnut-colored callus; interior chocolate brown. Length, 1·25 inches.

Australia.

Partakes of the characters of Neverita, and appears to be somewhat closely related to *N. Incei*, Reeve, belonging to that group. *N. sanguinolenta*, Desh. (fig. 8), is a synonym.

N. DUNKERI, Phil. Pl. 21, fig. 7.

Rather solid, smooth, yellowish gray, light-banded at the suture, and with indistinct darker bands on the last whorl; umbilical region defined by an angle, umbilicus completely filled by the white columellar callus. Length, 17 mill.

Habitat unknown.

This species is placed here because Philippi compares it with *N. melastoma;* I cannot see any resemblance between the two. *N. Dunkeri* has not been recognized by subsequent authors.

N. SOLIDA, Blainv. Pl. 20, fig. 98.

Thick, smooth, fulvous or chestnut-brown, with a rather broad lighter band at the suture, and another below the periphery;

columellar callus chocolate-colored, broadly reflected, nearly covering the similarly colored narrow umbilicus.

Length, 30 mill.

Singapore, *Philippines*.

The synonyms are *N. lupinus*, Desh.; *N. melanostoma*, var. of Gmelin, and *N. cinnamomea*, Menke.

N. INTEMERATA, Phil. Pl. 18, fig. 83; Pl. 19, fig. 93.

White, deeply umbilicated with a central obtuse entering callus. Length, 1·5 inches.

Mazatlan.

N. alabaster, Reeve (fig. 93), is identical. Carpenter thinks it a variety of *N. uber*, Val.; this is not unlikely, but if so, it establishes a range of variation in form, umbilicus and callus, which may reduce the white Mammas to a single species.

N. CANDIDISSIMA, Le Guillou. Pl. 16, fig. 49; Pl. 19, fig. 95.

Globosely neritoid, very solid, whorls polished, ivory-white; callus broad, slightly entering the rather wide umbilicus.

Length, 33 mill.

Moluccas, *North Australia*.

Is *N. Jukesii*, Reeve (fig. 95) = *N. candidissima*, Recluz.

N. PHYTELEPHAS, Reeve. Pl. 19, fig. 97.

Globosely ovate, with sharp spire and linear suture; white, under a very thin horny white epidermis showing indistinct revolving lines; umbilicus compressed, with a slight central entering callus, the columellar callus above often obsoletely divided by spiral depressions. Length, 1·25 inches.

Australia.

Perhaps not distinct from *N. candidissima*.

N. UNIMACULATA, Reeve. Pl. 19, fig. 96.

Pyriform ovate, compressly umbilicated; white, under a very thin horny white epidermis; columellar callus white, with a central projection entering the umbilicus, and chestnut-spotted on the face. Length, 1·25–1·5 inches.

Panama, *Mazatlan*.

N. ZOOLOGICA, Jousseaume. Pl. 20, fig. 3.

Somewhat inflated, solid, white; angulated around the widely open umbilicus; columellar callus rather narrow, chestnut tinged below. Length, 57 mill.

Hab. unknown.

Related by its coloring with the preceding species, from which it differs in form and in its much wider umbilicus.

N. CASTA, Phil. Pl. 17, fig. 63.

Whorls obliquely flattened above, angulated around the rather wide umbilicus; columellar callus moderate, entering the umbilicus; white. Length, 1·5 inches.

Hab. unknown.

Distinguished from the other species of the group by the wide umbilicus and sloping form of the body-whorl.

N. ALBUMEN, Linn. Pl. 20, fig. 5.

Obliquely depressed, orange-brown; umbilicus very wide, bordered by an angle, white, with a strong central entering callus. Length, 1·5–2 inches.

Singapore, Moluccas, Philippines.

N. COLUMNARIS, Recluz. Pl. 20, fig, 4.

Widely globose, pure white, polished, base strongly angulated around the very large umbilicus, which bears a slight spiral ridge and is more or less filled by a strong, broad central entering callus. Length, 1·5–2 inches.

Philippines, Mauritius.

It is *N. pes-elephantis*, Chemn., and probably *N. funiculata*, Recl.

N. DUBIA, Recluz. Pl. 16, fig. 50; Pl. 17, fig. 67; Pl. 18, fig. 73; Pl. 19, fig. 94.

Thick, with small spire and but slightly marked suture; white under a slight yellowish white epidermis; umbilicus narrow, bounded by an almost cord-like angle, in the adult nearly filled by an entering callus, at which place the columellar lip often is cut into one or two mamillary callous deposits.

Length, 1·25–1·75 inches.

Chili, Peru.

N. Atacamensis, Phil. (fig. 94), *N. amiculata*, Phil. (fig. 73), and *N. rapulum*, Reeve (fig. 67), are synonyms.

N. CORA, d'Orb. Pl. 19, fig. 86; Pl. 16, fig. 58; Pl. 19, fig. 84.

Shell thick, conical ovate, body-whorl obliquely flattened above; umbilicus narrow and deep, bounded by a ridge, partly

contracted by the broad, thick callus; white, under a thin yellowish white epidermis. Length, 18 mill.

W. Coast of South America.

A species of no marked character; perhaps not distinct from *N. uber*, Val. *N. elongata*, Troschel (fig. 84) appears to be identical.

N. UBER, Val. Pl. 17, figs. 61, 66.

Shell white, polished, under an extremely deciduous thin epidermis, columella densely enameled, usually covering the upper part of the narrow, deep umbilicus. Length, 1–1·5 inches.

Peru, *Panama*, *Mazatlan.*

Carpenter wrote of this shell: "The extreme forms of this species are so dissimilar as to have warranted their separation. An examination of some hundreds of specimens, however, shows that there is no consistency in the types. The shell is either thin or heavy; subglobular or very transverse; with the umbilicus quite open, or reduced by the callosity to a mere chink; the callus varying greatly in shape and intensity. The callosity projects considerably beyond the aperture, leaving a sutural groove. Umbilicus more or less slightly spiral."

Carpenter includes *N. uberina* of Adams' Genera, *N. ovum*, Menke, and *N. rapulum*, Reeve; also, somewhat doubtfully, *N. alabaster*, Reeve—which I have described separately. To this list is to be added *N. virginea*, Recluz (fig. 66), and possibly several of the species from western South America—*dubia*, Recluz, *cora*, d'Orb., etc. Finally, I can distinguish forms of *N. uber* from the Polynesian and East Indian *N. mamilla* in no way except by habitat.

N. PANAMENSIS, Recluz. Pl. 17, fig. 60.

Compressed on the sides into a quadrangularly ovate form; white, under a deciduous horn-colored epidermis; umbilicus narrow, nearly filled by the columellar callus.

Length, 1·5–2 inches.

Panama.

The peculiar form described above appears to be characteristic of the species.

N. LACTEA, Guilding. Pl. 16, figs. 54–57, 59, 52; Pl. 15, fig. 45; Pl. 17, fig. 62; Pl. 19, fig. 85.

Ovate, body-whorl a little slopingly flattened above, white, usually clothed with a thin yellowish epidermis; umbilicus moderate, partly filled with an entering callus which is often indistinguishably joined to the callus above. Length, 1 inch.

West Indies, *Canary Islands*, *Brazil*, *Cape Horn*.

The form appears to be moderately constant, and the epidermis is more persistent than in the other species; otherwise than in the latter particular it is undistinguishable from *N. uber*, of the Pacific Coast of N. America.

The synonymy includes *N. Caribæa*, Phil. (fig. 56); *N. nitida*, Donovan; *N. uberina*, d'Orb. (fig. 57); *N. Pfeifferi*, Phil. (fig. 45) = *N. pes-elephantis*, Pfr., not Chemn.; *N. porcellana*, d'Orb. (fig. 55), from the Canary Islands; *N. puella*, Phil. (fig. 85), an elongated variety, very like the *N. cora*, of West Coast of So. America; *N. puerilis*, Gould (fig. 59), from the same region as *N. porcellana* and *N. Philippiana*, Nyst (fig. 62) = *N. acuta*, Phil., preoccupied.

Var. OCHROSTOMA, Recluz. Fig. 52.

Aperture and columellar callus light ochraceous.

N. MAMILLA, Linn. Pl. 16, figs. 46, 48; Pl. 15, fig. 43; Pl. 17, figs. 65, 69.

Conically ovate, smooth, white, shining, body-whorl slopingly flattened above; columellar callus very thick, entirely covering the umbilicus. Length, 1·5–2·5 inches.

East Indies, *Philippines*, *N. Caledonia*, *Central Polynesia*, etc.

The synonymy includes *N. pyriformis* (fig. 48) and *N. intermedia*, of Recluz; *N. virginea* (fig. 69), and *N. vestalis* (fig. 43) of Philippi, and *N. alveata*, Troschel (fig. 65), said to have been collected on the Peruvian coast.

N. ALBULA, Recluz. Pl. 16, fig. 47.

Depressly globose, subventricose, whorls somewhat squarely convex, polished, obsoletely grooved-striated, white; columella densely callous, filling the umbilicus. Length, 2 inches.

Philippines.

Perhaps only a variety of *N. mamilla*, Linn.

N. Flemingiana, Recluz. Pl. 16, figs. 51, 53; Pl. 15, fig. 44.

Conically ovate, white, with a dense callosity almost covering the umbilicus. Length, 1–1·5 inches.

China, *Philippines*, *Australia*, *Viti Islands*, etc.

Only distinguished from *N. mamilla* by its umbilicus, and probably a form of that species. *N. Vavaosi*, Le Guillou (fig. 44), and *N. galactites*, Phil. (fig. 53), are synonyms.

N. glabella, Reeve. Pl. 21, figs. 10, 11.

Narrowly deeply umbilicated, subfusiformly oblong, rather solid; columella with a broadly reflected callosity above; transparent white, flesh-tinged, callosity flesh-colored. Length, 13 mill.

Hab. unknown.

Reeve figures this as a reversed species, but does not so describe it; Sowerby's figure is dextral.

Section Mamilla, Schum., 1817.

N. melanostoma, Gmel. Pl. 21, figs. 13–18; Pl. 22, fig. 21.

Smooth, polished, with obsolete engraved spiral lines; flesh-white, obscurely banded with light flesh-brown, columella and umbilicus chocolate-colored. Length, 1·5–2 inches.

East Indies, *Philippines*, *Western Polynesia*, *Mauritius*, *Madagascar.*

The above diagnosis will define the species in a restricted sense; the variations of form and coloring are numerous, and it would be easy to include most of the other species as varieties at the most.

N. opaca, Recluz is a synonym.

Var. Zanzebarica, Recluz. Fig. 15.

Shell a little more quadrangular in shape than the type, the striæ more strongly impressed, the brown bands broken up into series of irregular longitudinal markings.

Var. melanostomoides, Quoy. Figs. 16, 21.

Founded on thin, young specimens, with the bands broken up into chestnut spots, frequently becoming obsolete. Washed-out specimens of this form are *N. Sebæ*, Souleyet (fig. 16). Very probably the unfigured *N. bicincta*, Recluz, is also an example of this variety.

Var. FIBROSA, Souleyet. Fig. 17.

The spiral bands distinct.

Var. SUCCINEOIDES, Reeve. Fig. 18.

Shell white, without markings, columella and umbilicus chocolate-colored.

N. SIMIÆ, Desh. Pl. 21, figs. 19, 20.

Flesh-white, marbled with fawn-colored or light olivaceous rather obscure markings, with three or four revolving series of short irregular chestnut streaks and spots; umbilicus and columella chocolate-colored. Length, 1–2 inches.

Philippines, New Zealand, Viti Islands.

Embraces *N. simioides*, Recluz, of Reeve, and probably *N. Samarensis*, Recluz—both of them unfigured. *N. Bernardii*, Recluz (fig. 20), appears to be a slight color-variety. Its habitat is "? Gulf of Mexico," doubtless an error.

N. FILOSA, Sowb. Pl. 22, fig. 22.

Shell decussated by rather rugose growth-lines, and very close fine waved revolving striæ; whitish, obscurely wide-banded with faded chestnut, columella and umbilicus chocolate-colored. Length, 1·5 inches. *Australia.*

Very like *N. melanostoma* in form and coloring, but has not the polished surface of the latter species, and is immediately recognized by the very close thread-like revolving striæ.

N. PRIAMUS, Recluz. Pl. 22, fig. 23.

Thin, inflated, polished, pale chestnut- or fawn-color, with two spiral series of small chestnut spots; callus thin, but filling the umbilicus, chocolate-colored. Length, 1·5 inches.

Moluccas.

N. MAURA, Brug. Pl. 22, fig. 24.

Polished, chestnut- to chocolate-colored, obliquely strigate with darker color; columella and umbilicus chocolate-colored; aperture brownish white. Length, 1·5–2 inches.

Philippines.

E. MACROSTOMA, Phil. Pl. 22, fig. 25.

Globosely swollen, polished; white, here and there strigate with chestnut, and with two bands of chestnut spots and streaks. Length, 1·5 inches. *Habitat unknown.*

N. UMBILICATA, Quoy. Pl. 22, fig. 26.

Shell thin, inflated, largely, obliquely, excavately umbilicated, obscurely decussately striated; subtransparent white with zigzag longitudinal light chestnut markings, often interrupted to make spiral series. Length, ·75 inch.

So. Australia.

N. globosa, Tenison-Woods is a synonym.

N. MACROTREMA, Ad. and Reeve. Pl. 22, fig. 27.

Smooth, thin, very largely excavately umbilicated; greenish white. Length, 1 inch.

Borneo.

Perhaps a faded condition of the preceding species.

Subgenus AMPULLINA, Lam., Defrance, 1821.

N. FLUCTUATA, Sowb. Pl. 22, fig. 28.

Obliquely globose, rather thin, polished; light fawn-color, obscurely darker banded, overlaid with zigzag white streaks; columella white, densely callous, bordered with chestnut, completely overlaying the umbilicus; interior whitish, interruptedly banded with light chestnut. Length, 2–2·5 inches.

Philippines.

It is *N. imperforata*, Jay.

Subgenus AMAURA, Möller, 1842.

N. CANDIDA, Möller. Pl. 22, fig. 29.

Thin, imperforate, bulimiform, with considerably elevated spire; white, under a thin epidermis. Length, 12 mill.

Greenland.

Section ACRYBIA, H. & A. Adams, 1853.

N. FLAVA, Gould. Pl. 22, fig. 30.

Shell thin, subglobose; aperture large, columella sinuous, a little dilated above, umbilicus none; white, under a thin straw-colored epidermis. Length, 1 inch.

Maine, *Newfoundland*, northwards;

Finmark, *Nova Zembla.*

N. aperta, Lovén, and *N. Smithii*, Brown, are identical.

Section AMAUROPSIS, Mörch, 1857.

N. HELICOIDES, Johnson. Pl. 22, fig. 31.

Thin, with channeled suture; umbilicus a narrow line; chalky white, covered with a light yellowish brown epidermis.

Length, 1–1·5 inches.

Newfoundland, *Arctic Ocean*, *Norway*, *Siberia*.

It is *N. canaliculata*, Gould, *N. fragilis*, Leach, *N. cornea*, Möller, and perhaps *N. Islandica*, Gmelin.

N. PURPUREA, Dall. Pl. 22, fig. 32.

Suture channeled, umbilicus a mere chink or closed, inner lip with a thin callus; whorls 4, inflated, with fine revolving grooves; purplish brown, under a yellowish epidermis. Length, 1 inch.

Alaska.

Differs from the preceding species in sculpture and color, and is usually more globose.

N. GLOBULUS, Angas. Pl. 22, fig. 33.

Rimate, rather thin, shining; orange horn-color, much paler on the last whorl towards the aperture; two narrow concentric raised keels on the subapical whorl; nearly smooth, a few microscopical spiral striæ here and there crossing the growth-lines; columella slightly thickened and expanded over the umbilicus. Length, 5 mill.

Holdfast Bay, *So. Australia*.

The pertinence of this species to Amauropsis is very questionable.

Subgenus AMAURELLA, A. Ad., 1867.

The species, three in number, are unfigured: *N. Japonica*, *N. glabrata* and *N. semistriata*, A. Ad.

Japan.

Unfigured and Undetermined Species.

N. RUSSA (*Arctic Ocean*) and N. SEVERA (*Japan*), of Gould.

N. PHILIPPINENSIS (*Philippines*), N. ATRYPA (*W. of Cape York*, *S. W. of Papua*), N. PSEUSTES (*Fiji Islands*), N. SUTURALIS (*Kerguelen Isl.*), N. RADIATA (*Bermuda*), N. AMPHIALA (*E. N. E. from N. Zealand*), N. LEPTALEA (*West Indies*). N. XANTHA

(*near Kerguelen Isl.*), N. PRASINA (*Kerguelen Isl.*), N. FARTILIS (*Kerguelen Isl.*), N. APORA (*Off Arru Islands*), N. AMPHIALA (= N. VITREA, Hutton, *N. Zealand*), all of Watson.

N. AUSTRALIS and N. VITREA, Hutton. *New Zealand.*

N. PARVULA, Tapparone-Canefri. *Papua.*

N. NUCAHIVENSIS, Jardin. *Marquesas.*

N. GRISEA, N. SCULPTA and N. PERSCALPTA, Martens. *Kerguelen's Isl.*

N. MALABARICA (*Malabar*), N. TOURNEFORTI (*Seychelles*), N. PUNCTICULATA and N. ALEXANDRIÆ (*Hab.?*), of Recluz.

N. UNDATA and N. PUTAMEN, Meuschen (Adams' Genera).

N. ALBA, Potiez et Mich. *Hab.?*

N. STRIATA, Anton. *Hab.?*

N. FRINGILLA, Dall. *West Indies.*

N. APERTA, Sowb. *Hab.?*

N. PARVULA (*Borneo*), and N. SANDALINA (*Sandalwood Bay*), of Le Guillou.

N. AFFINIS, Gmelin. *Northern Seas.*

N. QUADRIFASCIATA, Gray. *Hab.?*

N. RHODOCHEILA (*New Caledonia*), and N. MÖRCHI (*Australia*) of Ads. and Reeve.

N. OBTURATA, Phil. *Magellan's Strait.*

N. SEMIPELLUCIDA, N. FABA, N. CAFFRA, N. OBLIQUATA, Marrat. *W. Coast of Africa.*

N. SERTATA and N. SAGITTATA, Menke. *Australia.*

N. NANA, N. GLOBOSA, N. TASMANICA, Tenison-Woods. *Tasmania.*

N. BEDDOMEI, Johnston (N. POLITA, Tenison-Woods in part). *Tasmania.*

N. SUBCOSTATA, Tenison-Woods. *Australia.*

Genus RUMELLA, Bourguignat, 1885.

According to Bourguignat, the Naticidæ are added to the remarkable assemblage of marine forms inhabiting Lake Tanganika in Central Africa. No figures of the shells have been published, nor are the animal and operculum known. Two species have been described —

R. GIRAUDI and R. MILNE-EDWARDSIANA, Bourg. *L. Tanganika.*

Genus SIGARETUS, Lam., 1799.

Typical Species.

S. CONCAVUS, Lamarck. Pl. 23, figs. 36, 37; Pl. 22, fig. 34.

Fawn-colored, with thin white columellar callus reflected over the umbilicus; interior chestnut-brown. Diam. 1·5–2 inches.

Peru, Chili, San Pedro, California.

I have before me a specimen collected living at the latter locality by Mrs. A. E. Bush. The synonyms are *S. maximus*, Phil.; *S. cymba*, Menke; *S. Grayi*, Desh; *S. neritoides*, Recluz, non Linn.; ? *S. latifasciatus*, Reeve, not Ads. and Reeve; *S. haliotoideus*, Reeve, not Linn (fig. 34). According to Dunker, this species occurs also on the West Coast of Africa.

S. NERITOIDEUS, Linn. Pl. 22, figs. 35, 38–40.

Less globose than the preceding species, and showing less of the body-whorl below. Diam. 1·25–1·75 inches.

East Indies.

S. latifasciatus, Ad. and Reeve (fig. 38); *S. Javanicus*, Gray (fig. 39); *S. insculptus*, Ad. and Reeve (fig. 40), and *S. Leachii*, Phil., are synonyms.

S. JAPONICUS, Lischke. Pl. 23, figs. 44–46.

Convex, spire somewhat prominent, solid, with slight spiral striæ, scarcely undulated, the interstices alternating broader and narrower, whitish. Diam. 21 mill.

Japan.

Differs a little in form from the preceding species, of which it may be only a variety, or even a synonym.

S. LÆVIGATUS, Lam. Pl. 24, figs. 47–51.

Convex, thin, translucent white, sometimes obsoletely fasciate with chestnut, very finely undulately striate, almost smooth. Diam. 1·5 inches.

Indian Ocean, Java, Australia.

The synonyms are *S. Australis*, Hanley (fig. 50), *S. zonalis*, Quoy (fig. 57).

S. CUVIERIANUS, Recluz. Pl. 24, figs. 55, 56.

Depressed ovate, spire small, rather prominent, spirally corded throughout; white, spire flesh-colored. Diam. 28 mill.

Philippines.

S. EXIMIUS, Reeve. Pl. 24, figs. 52–54.

Convex, thin, oblique, opaque white, whorls densely spirally corded. Diam. 15–20 mill.

Malacca, Australia.

S. argenteus, Reeve (fig. 54), from Australia, appears to be identical.

S. MARTINIANUS, Phil. Pl. 23, figs. 41–43.

Convexly curved, rather solid, whorls slightly concavely impressed round the suture, spirally wave-striated, growth-lines somewhat rugose; chestnut-brown, varying in intensity and sometimes obsoletely banded, under a thin yellowish brown epidermis, becoming whitish on the base, interior chestnut-tinted.

Diam. 1·5 inches.

West Indies.

This is *S. zonatus*, d'Orb., *S. maculatus*, *S. Petiti*, *S. Listeri*, and very probably *S. unifasciatus* (fig. 43), of Recluz.

S. MACULATUS, Say. Pl. 24, figs. 57, 58.

Globosely depressed, finely spirally striated; yellowish white, yellowish chestnut at the suture, and bearing on the body-whorl two spiral series of spots or maculations. Diam. 1·25 inches.

Florida.

In the young shell, as described and figured by Say (fig. 58) the maculations are more distinct and regular than in the adult. The species is still a rare one in collections; it may eventually prove to be only a variety of the preceding one.

S. BIFASCIATUS, Recluz Pl. 24, figs. 59, 60.

Flatly depressed, finely undulately waved-striated; whitish under a yellowish epidermis, with two interrupted bands or series of maculations of chestnut-brown color. Diam., 17·5 mill.

Guinea, W. Africa.

S. Menkeanus, Dunker, is a synonym. Distinguished at once from the foregoing species by its dorsal flattening.

S. SINUATUS, Recluz. Pl. 24, figs. 62, 63.

Auriform, convex, thin, pellucid, white, undulately striate.

Diam., 29 mill. *Red Sea.*

S. PERSPECTIVUS, Say. Pl. 24, figs. 61, 64.

More or less flatly convex, white under a light yellowish epidermis, dorsally covered with slightly waved spiral striæ, base flattened. Diam., 1·5 inches.

New Jersey (rare), *North Carolina* to *West Indies.*

Say has compared his species with *S. Leachii*, Blainv., and several authors have identified it with that species; but the latter is really indeterminable, and has accordingly been variously interpreted. The synonymy easily includes the following: *S. depressus*, Phil., a West Indian species; *S. Antillarum*, Recluz, perhaps *S. halioitoideus* of Lamarck and some other authors (not Linnæus), and *Cryptostoma Carolinum* of Cuvier. The problematical *S. Leachii*, Blainv., may possibly be here referred.

S. DEBILIS, Gould. Pl. 24, fig. 65.

Flatly convex, spirally striate above, smooth below, a little depressed round the suture; white, more or less stained with rusty yellow. Diam., 28 mill.

Lower California.

I cannot detect any difference in the shell between this species and *S. perspectivus.*

S. PHILIPPII, Weinkauff. Pl. 24, figs. 66–68.

Shell small, white, spirally slightly undulately striate. Diam., 18 mill.

Mediterranean.

This is *S. haliotoideus*, Philippi, not Linnæus, and bears several additional names in its fossil condition, if these fossil forms really are the same species. Some authors have identified the Linnæan *S. haliotoideus* as this species, but it is indeterminable. It would be difficult to point out any good distinctive characters between this and the preceding and following species.

S. INCISUS, Reeve. Pl. 24, fig. 69; Pl. 25, figs. 70–72.

Dorsally flatly depressed, strongly spirally striated, striæ slightly undulated; white. Diam., 1–1·5 inches.

Straits of Malacca, Japan.

Differs from *S. perspectivus* in locality only; a comparison of the characters of the voluminous soft-parts of these animals will be necessary in order to definitely decide upon the validity of

the species. *S. undulatus*, Lischke (figs. 70–72) appears to me to be very similar.

S. Delesserti, Recluz. Pl. 25, figs. 73, 74.

Plano-convex, thin, pellucid, yellowish chestnut, somewhat zoned, interior chestnut-colored. Diam., 32 mill.

Philippines.

Dr. Weinkauff refers to this species a shell with a well-defined chestnut-band (fig. 74); he thinks it scarcely distinguishable from *S. lævigatus*, Lam.

S. planulatus, Recluz. Pl. 25, figs. 75–77.

Much flattened on the dorsal side, white, under a very thin yellowish epidermis, smooth, or with obsolete or very slight spiral striæ. Diam., 1·25–1·5 inches.

Zanzibar, *Philippines*, *Australia*.

Distinguished by its smooth flattened surface. It is *S. planus*, Phil., *S. Gualterianus*, Recluz, *S. lacteus*, Recluz (fig. 77), *S. Indica*, Gray.

Section Eunaticina, Fischer, 1885.

S. papilla, Gmelin. Pl. 25, figs. 78, 79, 87, 88.

Whitish, under a yellowish epidermis, moderately umbilicated, spirally engraved. Length, 33 mill.

Tranquebar, *Moluccas*, *Japan*, *Philippines*.

It is *S. costulatus*, Quoy and Gaimard, *S. acuminatus*, Ad. and Reeve. The following appear to me to be only varieties: *S. coarctatus*, Reeve (fig. 79), *S. nitidus*, Reeve (fig. 87), *S. acuminatus*, Ads. and Reeve (fig. 88).

S. tumescens, Reeve. Pl. 25, fig. 82.

Rather thin, ventricose, body-whorl not slopingly flattened. Length, 1 inch.

Hab. unknown.

Probably only a variety of the preceding species.

S. oblongus, Reeve. Pl. 25, fig. 83.

Resembles *S. papilla* in form, but the sculpture instead of incised linear grooves, consists of numerous raised threads. Length, 30 mill.

Hab. unknown.

Very doubtfully distinct from *S. papilla*.

S. PELLUCIDUS, Reeve. Pl. 25, fig. 84.

Rather solid, deeply umbilicated, transparent white, spirally linearly incised, grooves stronger next the suture.

Length, 12 mill.

Malacca.

S. MAMILLARIS, Linn. Pl. 25, figs. 85, 86.

Umbilicated, rather thick, white, spirally remotely sulcate, suture channeled. Length, 1 inch.

Seychelles, Madagascar?

S. LINNEANUS, Recluz. Pl. 25, figs. 89, 90.

Umbilicated, thin, white, narrowly regularly spirally grooved, pellucid. Length, 22 mill.

Sunda Islands, Philippines.

S. Lamarckianus, Recluz (fig. 90), and probably *S. cancellatus*, Swains. (not described), are synonyms.

S. FIBULA, Reeve. Pl. 25, fig. 91.

Rather solid, umbilicated, white, whorls slopingly flattened above, then gibbose, smooth, or obliquely minutely striate.

Length, 14 mill.

Singapore.

Probably an immature shell, perhaps of *mamillaris.*

S. PICTUS, Reeve. Pl. 25, fig. 92.

Rather thin, deeply umbilicated, smooth, shining, white, with obscure revolving bands of short, longitudinal chestnut markings. Length, 1 inch.

Adelaide, So. Australia.

Unfigured and Undetermined Species.

S. SOUVERBIEI, Folin. This is merely an embryonic shell, 3·5 mill. diameter. It is useless to reproduce the figure.

S. CAROLINUS, Dufo. *Seychelles Is.*

S. HELICOIDES, Guillou. *Amboina.*

S. AUSTRALIS, Dunker. *Australia.*

S. LUCIDUS, Gould. *North China.*

S. FILICATUS, Mighels. *Zanzibar.*

Subfamily II. *Lamellariidæ.*

Genus LAMELLARIA, Montagu, 1815.

The monographic and anatomical study of this group of shells, by Bergh (Mem. Acad. Copenhagen, v, ser. iii, 1853), may be consulted with advantage by the student.

L. LATENS, Müller. Pl. 26, figs. 93–95, 98.

Shell thin, white, semipellucid, smooth, shining.
Length, 12 mill.

Norway, Great Britain.

The animal has a depressed mantle, a little convex over the shell, rather smooth, sparsely spotted with brown, densely radiately striate below. *Sigaretus Strömii*, Sars, is a synonym, and I think that *L. tentaculata* (Montagu), Forbes, and Hanley (fig. 98), also belongs here, as well as *L. stomatella*, Risso.

L. PERSPICUA, Linn. Pl. 26, figs. 96, 97, 99.

Shell haliotiform, polished, outer lip somewhat contracted above. Length, 16 mill.

Europe.

Animal lemon-colored with oval clear specks or else tessellated with milk-white, or reddish brown with irregular yellow dots; mantle with large tubercles, each surrounded by a border of flake-white, and having a small dark central speck.

Var. LATA. Fig. 99.

Shell smaller, broader, more compressed, but not flattened nor contracted in front. This variety, says Dr. Jeffreys, may possibly equal the preceding species.

The male and female differ somewhat, and have been separated as distinct species. The synonymy includes also *L. ampullacea*, Maravigna; *L. haliotoidea*, Müller, etc. (not Linn.); *L. Morelli*, Chiaje; *L. Kindelmaniana*, Mich.; *L. producta*, Leach; *L. complanata*, Leach; *L. convexa*, Bouchard; *L. Audouini*, Cantr.; *L. zonifera*, Bergh (fig. 99); *L. neritoidea*, *L. Adansonii*, and *L. flava*, Chiaje.

For a description of the habits of this mollusk see "Structural and Systematic Conchology," ii, 208.

L. PELLUCIDA, Verrill. Pl. 26, fig. 100.

Shell ovate, with oblique spire, delicate, transparent, smooth; aperture broad, ovate, not showing the interior of the spire except from an endwise view. Length, 12–16 mill.

Martha's Vineyard, Mass.; off Delaware Bay, 86–208 fms.

Animal yellowish brown, mottled with darker, broad elliptical, swollen, without tubercles on the back.

Var. GOULDII, Verrill.

Shell a little shorter, broader, with the spire lower, the apex less elevated, and suture less impressed; last whorl more ventricose, and the outer lip and aperture more broadly rounded. Mantle shorter, broader and higher, with more or less numerous low verrucæ on the dorsal surface; pale yellow or yellowish white, more or less blotched or speckled with brown, flake-white and yellow. Prof. Verrill thinks that part of the differences in the soft parts arise from contraction in alcohol; some specimens are intermediate.

L. TENUIS, Jeffreys. Pl. 26, figs. 1, 2.

Thin, fragile, semitransparent, glossy, white, microscopically spirally striate, base with a small but distinct umbilicus.

Length, 2·5 mill.

St. 16, Atlantic O. (Porcupine Expedition).

This young shell is scarcely a Lamellaria; at least, I know of no other species having an umbilicus.

L. ANTARCTICA, Couthouy. Pl. 26, figs. 3, 4.

Shell not observed. Animal with back reticulated on an orange-brown surface, the reticulating lines bordered with white dots, and the intervals covered with larger ones of bright yellow; under side of mantle rose-color, narrowly margined with dark red; foot lemon-color, paler towards the middle.

Length, 1·6 inches.

Orange Harbor, Patagonia.

L. PRÆTENUIS, Couthouy. Pl. 26, fig. 5.

Back of animal greenish ochraceous, longitudinally wrinkled, with a short cinereous pubescence; under side of mantle and foot light brownish yellow. Length, 1·25 inches.

Shell not observed.

Orange Harbor, Patagonia.

L. Patagonica, Smith. Pl. 26, figs, 6–8.

Shell large, very fragile, transparent hyaline, with a slight milky cloudiness, showing very fine growth-striæ; whorls $3\frac{1}{2}$, suture deep. Diam., 1 inch. Mantle dirty yellow, with lines and blotches of light vandyke brown, the under surface around the foot marked with light-colored striæ.

Patagonia.

Is possibly identical with *L. Antarctica*, Couth.

Section Chelynotus, Swains.

L. Tongana, Quoy and Gaimard. Pl. 26, fig. 11; Pl. 27, figs. 14–16, 18.

Shell shining white, pellucid, margin brown. Length, 28 mill.

Animal with a thick mantle, tuberculate, the tubercles large, subhexagonal, black, anteriorly produced and bifid; foot narrow, brownish. Length, 85 mill.

Tonga Tabou.

This and several following species belong to a section characterized by the produced anterior portion of the mantle and narrower foot. Very probably *L. Berghi* is a synonym of the present species, or of the next one; *Coriocella nigra* of Blainville (fig. 16) is also perhaps identical, but cannot be made out with certainty. *L. Cuvieri*, Bergh (fig. 18), appears to be an individual contracted in alcohol.

L. Mauritiana, Bergh. Pl. 27, fig. 17.

Shell elevated, yellowish white, pellucid, smooth, with distinct incremental striæ. Length, 1 inch.

Mauritius.

L. Berghi, Desh. Pl. 26, figs. 9, 10.

White, pellucid, striate; open below, showing the whorls. Length, 16 mill.

Mauritius.

In the specimens before me the margin of the aperture is narrowly tinted with brown.

L. isabellina, Bergh. Pl. 26, fig. 19.

Undescribed. The figure represents an oval, flat, white-margined species, the back light purplish with white spots. Length, 10 mill.

? Philippines.

Shell not figured.

L. GEMMA, Bergh. Pl. 26, fig. 20.

Undescribed. Violaceous, covered with small white specks, the middle of the back, and a few, mostly marginal, spots reddish. Length, 21 mill.

? Philippines.

Shell not figured.

L. STEARNSII, Dall. Pl. 27, figs. 12, 13.

White, suborbicular, depressed, whorls three, columella sharp, thin, widely arcuated, showing the apex from below; spire hardly elevated, suture distinct; aperture very effuse, rounded; exterior marked by growth-lines, crossed by microscopic revolving striæ. Length, 6·5–8 mill.

Monterey, Cal.

Mr. Dall described a var. *orbiculata*, which proves to be only sexually distinct; the differences being such as mark the sexes in the British species.

L. DIEGOENSIS, Dall. Pl. 27, figs. 21, 22.

Malleate, polished, white, translucent, orbicular, with deep suture, volutions to apex visible from below. Length, 16 mill.

S. Diego, Cal.

Less calcareous, and more globosely elevated than the preceding form, as well as larger, and malleated, with no trace of spiral striæ.

L. SEMPERI, Bergh. Pl. 26, fig. 23.

Undescribed. From the figure it appears to be black, with strong warty reticulations on the back, and anterior, and posterior wrinkled processes on either side. Shell not figured.

Length, 3 inches.

? Philippines.

Unfigured Species of Lamellaria.

L. (CORIOCELLA) PUNCTATA, Stimpson. *Japan.*
L. (CORIOCELLA) TUBEROSA, Stimpson. *China.*
L SPIROLINEATA, Monterosato. *Mediterranean Sea.*
L. KLECIACHI, Brusina. *Mediterranean Sea.*
L. RANGII, Bergh. *West Indies.*
L. INDICA, Leach (L. OPHIONE, Gray). *S. Australia, New Zealand.*
L. TRANSLUCIDA, Blainv. *Hab. unknown.*

Subgenus MARSENINA, Gray, 1850.

L. RHOMBICA, Dall. Pl. 26, figs. 24, 25.

Pure white, subrhomboidal, moderately elevated, whorls 3; columella thickened, stout, with a groove behind the callus; whorl appressed against and slightly flattened below the suture; spire very small, not elevated; aperture subquadrate, outer lip very much produced above and below, suture deep; surface smooth. Length, 12 mill.

Monterey, Cal.

Animal bluish translucent, white, the mantle only partially covering the shell. Unfigured.

L. GLABRA, Couthouy. Pl. 26, figs. 26–28.

Thin, pellucid, white, smooth and shining, whorls two, the first a mere nucleus, the aperture oval, very large. Length, 12 mill.

New England to *Greenland, Norway.*

It is *L. haliotoidea*, Gould, not Linn.; *L. micromphala*, Bergh, (figs. 27, 28).

L. GRŒNLANDICA, Moller. Pl. 26, figs. 29, 30.

Obliquely elevated, whorls 2, the last very large, whitish, shining. Length, 8 mill.

Greenland, Norway.

L. PRODITA, Lovén. Pl. 27, figs. 31, 32.

More obliquely elevated than the preceding species, with deeper suture, but perhaps only a variety of it.

Maine to *Greenland.*

L. AMPLA, Verrill. Pl. 27, figs. 33, 34.

Inflated, subglobular, the spire not elevated.

Eastport, Maine.

Genus ONCIDIOPSIS (Beck), Bergh, 1853.

O. GLACIALIS, Sars. Pl. 26, figs. 35, 36.

Shell thin, hyaline, slipper-shaped, flexible. Length, 16 mill.

Animal with a long, narrow foot; the mantle subverrucose, ash-colored, maculated with brown.

Norway.

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O. GRŒNLANDICA, Bergh. Pl. 27, figs. 37, 38.

Shell thin, flexible, subcorneous, with coarse irregular growth-lines.

Animal with verrucose mantle, color not described.

Greenland.

Possibly = the foregoing species.

O. CARNEA, Kroyer. Pl. 27, fig. 39.

Shell more elongated than in the preceding species, with a short wing-like production on the left side.

Animal with high, rounded mantle, verrucose.

Greenland.

O. recondita, Kroyer, is the juvenile of this species.

? Genus CALEDONIELLA, Souverbie, 1869.

The animal has not been observed; it is therefore somewhat doubtful whether the genus really belongs in the Naticidæ.

C. MONTROUZIERI, Souverb. Pl. 27, fig. 40.

Imperforate, heliciform, depressed, thin, fragile, finely striate, the striæ somewhat pliciform at the suture, translucent, white, under a very thin shining yellowish epidermis; whorls 3 to $3\frac{1}{2}$, suture narrowly channeled and margined; extremities of the lip joined by a parietal callus. Diam., 7 mill.

New Caledonia.

Genus VELUTINA, Fleming, 1822.

V. LÆVIGATA, Pennant. Pl. 27, figs. 41–44, 48, 59.

Shell thin, translucent, whitish, or usually light pink, with numerous fine revolving striæ crossing the minute growth-lines; epidermis thin, transparent horn-color, somewhat tufted on the revolving striæ; whorls $3\frac{1}{2}$, suture deeply impressed.

Length, 16 mill.

Northern United States to *Greenland*, *Northern Europe*, *Kamtschatka.*

Often credited to Linnæus, but his *Helix lævigata* may be regarded as a lost species. It is *Bulla velutina*, Müller, *V. haliotoidea*, Fab.; *V. capuloidea*, Blainv.; *V. striata*, Macgill; *V. rupicola*, Conr.; *V. Mulleri*, Desh. (figs. 44, 48), the latter a large

variety from Kamtschatka. *V. solida*, Martens (fig. 59), is founded on a large, pink specimen, denuded of epidermis.

The animal is said to discharge a very copious, tenaceous clear white slime, which is frothy, and perhaps serves the Velutina for concealment.

V. LANIGERA, Möller. Pl. 28, figs. 51, 52.

Very thin and fragile, smoothish, incremental striæ slight; epidermis yellowish brown, shortly, densely pubescent.

Length, 13 mill.

Greenland, *Finmark*.

V. PROLONGATA, Cpr.

Pink, under a smooth, thin, yellowish epidermis, the growth-lines crossed by very fine slight spiral impressed striæ; whorls 3½, the last very large, suture deeply impressed; aperture long oval, junction of columellar and outer lip somewhat angulated.

Length, 10 mill.

Vancouver's Isl.

Unfigured. My specimen is in too imperfect a condition for illustration.

Section LIMNERIA, H. & A. Adams, 1883.

V. ZONATA, Gould. Pl. 28, figs. 53, 54.

Thin, with sharp minute growth-striæ; whitish, with several faint chestnut-colored revolving zones, under a very thin smoothish epidermis; whorls less than three, spire minute, suture deeply impressed; columella flattened, with shallow channel behind. Length, 11 mill.

New England, northwards;

Arctic Seas of both continents.

An arctic specimen measuring 21 mill. has been called var. *grandis* by Mr. E. A. Smith. Sars has described a var. *expansa* (fig. 53). It is *V. canaliculata*, Beck. Sometimes the zones are absent. *V. zonata* has sometimes been placed erroneously in the pulmoniferous genus Otina, the shell of which, although much smaller, resembles it.

Section VELUTELLA, Gray, 1847.

V. PLICATILIS, Müller. Pl. 28, figs. 55–57.

Nearly membranous, translucent, with obscure spiral striæ and irregular growth-lines; yellowish or yellowish brown; whorls $2\frac{1}{2}$, ventricose in fresh, but compressed (from collapse) in dried specimens, suture deep; epidermis tough, but readily separated into slight fibrous plaits. Length, ·5 inch.

The animal is bright orange color, sometimes speckled with yellow.

Northern Europe, Greenland.

Is *Bulla flexilis*, Montagu. *V. coriacea*, Pallas, may be only a large variety.

V. CORIACEA, Pallas. Pl. 27, figs. 49, 50.

Membranaceous, corneous, subpellucid, rugosely striate; whorls $2\frac{1}{2}$, the last very large, expanded.

Kurile Islands.

V. CRYPTOSPIRA, Middendorff. Pl. 27, figs. 45–47.

Shell narrower, more elongated than *V. lævigata*, the columellar lip forming an angle with the outer lip below; coriaceous, or with a very slight calcareous deposit. Length, 10 mill.

Ochotsk Sea, Alaska, etc.

Undetermined and Unfigured Species.

V. BERNARDI, Martens (Pl. 28, fig. 58). *Hab. unknown.*
V. PUSIO, A. Ad. *Straits of Corea.*
V. SIGARETIFORMIS, Potiez. (A young Natica?) *Australia.*
V. SITKENSIS, A. Ad. *Sitka.*
V. STYLIFERA, Fleming = *Stylifer Turtoni.*
V. MARGARITACEA, Duclos. *Australia.*

Subfamily III. VANIKORINÆ.

Genus VANIKORO, Quoy and Gaimard, 1832.

V. CANCELLATA, Lam. Pl. 29, figs. 60, 61.

Broadly patulate, rather thick, cancellated with oblique rather lamellar ribs and thin spiral ridges; epidermis yellowish brown. Diam. 1 inch.

Isl. of Vanikoro.

V. Quoyi, Recluz, is a synonym. Many of the following "species" are probably only slight and unstable modifications of this form.

V. GUERINIANA, Recluz. Pl. 29, fig. 62.

Ribs stronger than in the preceding species, the spiral ridges seen in their interstices; umbilicus much wider. Diam. 15 mill.

Philippines.

V. RUGATA, A. Ad. Pl. 29, fig. 63.

Spire elevated, whorls rather strongly plaited, the deep interstices spirally ridged, umbilicus moderate. Diam. 10 mill.

Hab. unknown.

V. CIDARIS, Recluz. Pl. 29, fig. 64.

Rather thin, clathrate with nearly equal longitudinal and spiral sculpture, umbilicus narrow, almost closed. Diam. 22 mill.

Philippines.

Ribs not so strong as in *V. cancellata*, spire somewhat more elevated.

V. LIGATA, Recluz. Pl. 29, figs. 65–72.

Rather thin, longitudinal sculpture low oblique folds, becoming obsolete, spiral sculpture thread-like; umbilicus moderate. Diam. 1 inch.

Philippines, Paumotus.

A little more elevated than *V. cidaris*, with larger umbilicus. *V. Petitiana* (fig. 66), *V. helicoides* (fig. 68), and *V. plicata*, Recluz (fig. 67), appear to me to be very slight modifications of the type form, principally in the oblique riblets being somewhat more or less prominent; whilst in *V. Deshayesiana* (fig. 69), *V. Blainvilliana* (fig. 71), and *V. Souleyetiana* (fig. 70), of Recluz the growth sculpture is obsolete or faint. Of this form *V. delicata*, Pease (fig. 72), appears to me to be the young; it comes from the Paumotus.

V. CLATHRATA, Recluz. Pl. 29, figs. 73–77, 83.

Rather thick, cancellating sculpture subequal, umbilicus moderate. Diam. 10 mill.

Hab. Polynesia, Australia, I. Bourbon.

Nothing but the smaller size appears to distinguish this from forms of the last species. *N. granulosa*, Recluz (fig. 74); *V. semiplicata*, Pease (fig. 75); *V. Cumingiana*, Recl. (fig. 76), and

V. disparilis, Desh. (fig. 83), are synonyms. *N. Sigaretiformis*, Potiez, has been considered synonymous; it is really unrecognizable. I add as a synonym *V. granifera*, Pease (fig. 77), from Ins. Jarvis. The granular appearance of the original figure (copied by me) is an exaggeration, and does not agree with the types before me.

V. SULCATA, d'Orb. Pl. 29, figs. 78, 79.

Revolving riblets most prominent, but rendered somewhat granular by the crossing of the growth sculpture; umbilicus moderate. Diam. 9 mill.

West Indies.

Only distinguished from forms of the last species by locality. I figure a very young shell, in which the spiral ribs are much more prominent than they remain in the later whorls. *V. anomala*, Adams (unfigured), is probably the same.

V. STRIATA, d'Orb. Pl. 29, figs. 80, 81.

Rather thin, with fine spiral raised lines; umbilicus moderate. Diam. 8 mill.

Cuba.

Probably only a variety of *V. sulcata.*

V. lamellosa, d'Orb (fig. 81), is probably the young of this species, and *V. oxychone* and *V. Vitrinæformis*, Mörch (unfigured), synonyms.

V. ROSEA, Recluz. Pl. 29, fig. 82.

Cancellated, pink; umbilicus widely open. Diam. 5 mill.

Is evidently a juvenile shell.

Moluccas.

V. ELATA, Sowb. Pl. 29, fig. 84.

Elevated, thin, very finely decussated, umbilicus narrow. Diam. 9, alt. 10 mill.

China Sea.

V. ACUTA, Recluz. Pl. 29, figs. 85, 86.

Thin, white, subpellucid, very delicately sculptured, the spiral lines the most prominent; spire acute, umbilicus wide, aperture somewhat obliquely produced. Diam. 7–10 mill.

Lord Hood's Is., Cape Natal, Moluccas.

The above rather incongruous localities are given by Recluz; Mörch adds West Indies in considering the species a synonym

of *V. lamellosa*, d'Orb. I do not think it adult. *V. imbricata*, Pease (fig. 86), appears to be a younger state of the same species.

N. Recluziana, Ad. and Angas. Pl. 29, fig. 87.

Elevated, acuminated, spire cancellated, last whorl almost smooth, umbilical channel moderate, long.

Diam. 9, alt. 10·5 mill.

N. So. Wales.

V. solida, Sowb. Pl. 29, fig. 88.

Solid, globose, upper whorls cancellated, rounded, last whorl finely spirally and concentrically striated, columella tortuous, umbilical channel long and narrow. Diam. 9, alt. 11 mill.

Hab. unknown.

V. semisoluta, Sowb. Pl. 29, fig. 89.

Sculptured spirally with beaded ribs and concentrically with thin striæ, canal elongated, rather broad. Diam. 6, alt. 10 mill.

East Indies.

The lips are so produced as scarcely to touch the body-whorl.

V. Orbignyana, Recluz. Pl. 29, figs. 90–92.

Shell deeply and broadly cancellated with strong distant spiral ribs and concentric ridges; umbilicus narrow, deep.

Diam. 4 mill.

Habitat unknown.

Is *V. Quoyi*, Adams, not Recluz, and *V. Gaimardi*, Adams (fig. 91), *V. tricarinata*, Recluz (fig. 92), and *V. Cumingiana* of Reeve and Sowerby, not Recluz.

V. distans, Recluz. Pl. 29, fig. 93.

With distant longitudinal lamellæ, and closer spiral striæ in the interstices; umbilicus broad, semilunar. Alt. 6 mill.

Philippines.

V. foveolata, Montr. Pl. 29, fig. 95.

Strongly ribbed, crossed by thinner but prominent spiral sculpture; umbilicus very narrow. L. 5 mill., diam. 4 mill.

New Caledonia.

V. Cuvieriana, Recluz. Pl. 29, fig. 94.

Rather patulous, thin, very finely decussately sculptured, last whorl obliquely flattened, umbilicus broad. Diam. 10 mill.

Hab. unknown.

Unfigured or Undetermined Species.

V. TUBEROSISSIMA, Montagu.
V. GLABRISSIMA, Brown = GLABERRINA, Recluz.

The above two species erroneously introduced into the British catalogues are probably young West Indian shells, but indeterminable; the latter probably a Neritina.

V. MAURITIÆ, Recluz. A mere embryo. *Mauritius.*
V. OVOIDEA, Gould. = *Isapis.*
V. MONTROUZIERI, Souverb. *New Caledonia.*
V. APERTA, Carp. (Diam. 7·5 mill.) *Cape St. Lucas, L. Cal*

Appendix to Natica.

The following species are described, but not figured, by Rochebrune, in Bull. Soc. Philom., Paris, 102–104, 1884–5. The last is from Cape Horn, the others from Sta. Cruz, Patagonia.

N. LEBRUNI, N. COUTEAUDI, N. OMOIA, N. SECUNDA, N. PAYENI.

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Family *CALYPTRÆIDÆ.*

Shell limpet-like, with a more or less spiral apex, interior simple or partly occupied by a shelly process, variously shaped, to which the adductor muscles are attached.

Animal with a distinct head and lengthened muzzle; eyes near the external base of the tentacles; only one branchial plume is developed.

The bonnet-limpets are found adhering to stones and shells; most of them appear never to quit the spot on which they first settle, as the margins of their shells become adapted to the irregularities of the surface beneath, whilst some wear away the space beneath their foot, and others secrete a shelly base. The form and color of the shell both depend somewhat upon the situation in which it grows; those found on the inside of the mouth of dead shells are generally flat or even concave above and white; those attached to the outside of shells are convex and colored. The animal is supposed to feed on sea-weed and animalcules; and an individual kept alive in a glass by Professor Forbes, ate a small nudibranch (Goniodoris), its fellow prisoner. Both Calyptræa and Pileopsis sometimes cover and hatch their spawn under the forepart of the foot. The inner process or shelf of the shell forms a support for the viscera. The branchia of this family is composed of narrow, rigid filaments, and Gray has created for this type the division Plocamobranchia.

Subfamily *Calyptræinæ.*

Muzzle slit at its extremity; tentacles subulate, carrying eyes near their base; foot short, rounded oval; the single branchia finely and deeply pectinated; adductor muscle horse-shoe shaped or oval; jaws rudimentary; radula with a subquadrangular middle tooth, the margin pectinated, the central cusp longer; lateral teeth with denticulate margins; marginals narrow, curved, denticulate (plain in Capulus).

Shell conic, patelliform, the summit more or less spiral;

interior polished, porcellanous, simple or chambered by a diaphragm or variously shaped process, supporting the viscera; peristome entire. No operculum or attached base.

Subfamily *Hipponycinæ.*

Animal without foot, properly so-called; adductor muscle fixed to the interior of the shell above, and below either to the substratum excavated in the surface of the body on which the mollusk is attached, or to a ventral calcareous opercular-like piece which completely closes the aperture; inferior surface of the body encircled by a sort of ventral mantle with papillary margins, resembling the dorsal mantle and morphologically corresponding to the epipodium; muzzle long, deeply incised and terminated by two lateral lobes; tentacles long, subulate, the eyes sessile towards their base; a spatuliform growth below the neck; radula as in Calyptræinæ, the marginal teeth denticulated.

Shell conical, peristome simple, with or without an internal process attached at the apex, but an opercular piece normally forms the base to the shell and is soldered to the surface of the body on which it lives attached. The embryonic Hipponyx has a spiral shell.

These gastropods have so aberrant an appearance that they have been classed as Rudistes (Sowerby), and Brachiopoda (Morris), the opercular piece being taken for a ventral valve.

Synopsis of Genera.

I.—CALYPTRÆINÆ.

Genus CRUCIBULUM, Schum., 1817.

Differs from Calyptræa (described below), in having an internal cup-shaped lamina, the margin of which is entire, and which is attached on one side to the inner wall of the shell. Temperate and tropical seas.

Dentition, Pl. 30, fig. 2.

The synonyms are *Trelania*, *Catillina*, and *Neleta*, Gray, 1867; *Dispotæa*, Say, 1826, and *Calypeopsis*, Lesson, 1830.

Section BICATILLUS, Swainson, 1840.

Cup open and reduced to a curved lamina, adhering for its entire length. *Indian Ocean.* Fossil in the miocene of Aqui-

taine. The development of the cup appears to be arrested in this group; but I am inclined to believe that this is not always the case.

Genus CALYPTRÆA, Lam., 1799.

Shell conical, trochiform, with central, spiral apex, aperture basal, circular, entire; interior furnished with a spiral diaphragm, the columellar margin of which is twisted, forming a false umbilicus, free margin convex.

The animal (Pl. 30, fig. 7) has a short head, the muzzle bilobed, tentacles rather short, cylindrical, with the eyes on tubercles at their exterior base; foot short, rounded, obtuse behind, angular in front.

Dentition, Pl. 30, fig. 3.

The recent species are tropical and subtropical in their distribution; fossil, the genus first appears in the lower Cretaceous. *Galerus*, Humphrey, 1797, and *Mitella*, Leach, are synonyms.

Subgenus GALEROPSIS, Conrad.

Spire more elevated. *G. excentricus*, Gabb. Eocene.

Subgenus INFUNDIBULUM, Montfort, 1810.

Summit central, whorls plicate, axis imperforate.

Tropical and subtropical. Found in the tertiary of the United States and West Indies. *Trochita*, Schum., 1817, *Trochatella*, Lesson, 1830, and *Clypeola*, Gray, 1867, are synonyms.

Subgenus SIGAPATELLA, Lesson, 1830.

Shell oval with lateral apex, interior plate with submarginal axis, the free margin concave. *Haliotoidea*, Swains., 1840, and *Trochella*, Gray, 1867, are synonyms.

Genus CREPIDULA, Lam., 1799.

Shell oval, limpet-like, with a posterior, generally lateral spiral apex; interior with a lamina or shelf, covering the posterior half of the aperture.

Animal with head depressed, laterally dilated, muzzle short, bilobed, tentacles short, subulate; foot short, subtruncate in front, rounded behind.

Dentition, Pl. 30, fig. 4.

Adhering to shells or stones, and modifying the form and surface of their shells in accordance with the inequalities of their place of attachment; thus, the same species will be convex if on the outside of a Natica, concave if on its interior wall, ribbed in either direction, according to its attachment on the exterior of a Pecten, etc.; others again are attached in groups one over another on each others' shell.

The distribution is world-wide; the individual species have a wide range, which, added to their great variability, as in attached shells generally, has caused an enormous specific synonymy. Generically, the synonyms include *Sandalium*, Schum., 1817, *Crypta*, Humphrey, 1797, *Tylacus* and *Lyroscapha*, Conrad, *Crepipatella*, Lesson, 1830, *Proscenula*, Perry, 1811.

The following sections are founded on characters of little importance or stability:

Section Garnotia, Gray, 1867.

Apex median, posterior, detached and distant from the peritreme.

Section Crypta (Gray, in part, 1867), Fischer, 1885.

Surface spinose.

Section Ianacus, Mörch, 1852.

Shell depressed or concave above, apex posterior, but slightly lateral.

Section Siphopatella, Lesson, 1830.

Lamina produced in front, its columellar margin subtubular. *Ergæa*, H. and A. Adams, 1854, and *Noicia*, Gray, 1867, are synonyms.

Section Spirocrypta, Gabb, 1864.

Summit of shell posterior, lateral, submarginal, spiral; internal plate attached to the margin on the lower or outer side, curving upwards and inwards, and uniting with the opposite side at a considerable distance. The plate is subspiral, thus approaching *Infundibulum* and *Galerus*. *C. pileum*, Gabb (Struct. and Syst. Conch., t. lxiv, f. 78).

Cretaceous of California.

[Genus GALERICULUS, Seeley.

This genus has two distinct septa, the larger one originating below the incurved apex, the smaller one at the base. Only the cast is as yet known; the shell has the form of a Helcion, but its upper surface has not been observed. *G. altus*, Seeley (S. and S. Conch., t. lxiv, f. 79). *Cretaceous.*]

Genus CAPULUS, Montfort, 1810.

Shell conical, provided with epidermis, apex posterior and directed to the right, more or less spirally curved; aperture basal, the lip continuous, no interior process, the horseshoe-shaped muscular impression on the inner wall.

Animal with lengthened rostrum; tentacles subulate, with the eyes on bulgings at their outer bases; mantle margin fringed; foot suborbicular, simple; gill-plume placed obliquely across the mantle-cavity, the elongate linear laminæ partly exposed. Central tooth of the radula trapezoidal, the reflected margin triangular, having a long sharp median and very fine lateral cusps, laterals multicuspidate, marginals simple (Pl. 30, fig. 5).

The few species inhabit the seas of Europe, the East and West Indies, Western America, etc. Fossil, the genus commenced with the Silurian, and about twenty species are known.

These animals are said to feed on the seaweed that grows around them, and on small marine organisms. They appear to have but limited locomotion, being usually adherent and modifying the margin of the aperture of the shell according to the surface on which they live. Sometimes they wear away the surface beneath their foot, forming shallow excavations, or they secrete an imperfect shelly base by means of that organ. The egg-cases are membranous and are attached in a tuft at the front of the foot under the neck.

Pileopsis, Lam., 1812, and *Actita*, Fischer de Waldheim, are synonyms.

Section CAPULACMÆA, M. Sars.

Shell thin, patelliform, with thin epidermis; apex not spiral, somewhat inclined to the right and posteriorly. *Boreal Seas.* *Piliscus*, Lovén, 1859, and *Pilidium*, Midd., not Forbes, are synonyms.

Section Brocchia, Bronn, 1827.

Irregularly conical, apex slightly spiral, directed to the left; left margin with a profound sinus, its posterior half folded. Tertiary, 2 sp. *C. sinuosa*, Bronn (S. and S. Conch., t. lxiv, f. 80). A single living species is mentioned but not described as *C. reductus*, Desh., *Isle of Bourbon*.

Section Thyca, H. and A. Adams, 1854.

Shell conical, longitudinally grooved, transparent, slightly curved. *Indian Ocean*, a single species on Asteria.

Subgenus Metoptoma, Phillips, 1836.

Shell depressed, conical, elliptical, truncated behind, apex not spiral, posterior, slightly inclined posteriorly. Carboniferous, *Europe*, *United States*. *C. solaris*, Kon. (S. and S. Conch., t. lxxxiv, f. 52).

In the above-named work I included this among the sections of Patella, which it resembles exteriorly; the muscular impression is like that of Capulus. *Tryblidium*, Lindström, 1880, is a synonym.

[Subgenus Spiricella, Rang., 1828.

Shell flattened, elongated, with a sinistrally situated apex, and a corresponding cavity in the interior; muscular impression very indistinct.

C. unguiculus, Rang. (S. and S. Conch., t. lxv, f. 96, 97). Miocene, *France*.

The relations of this group are obscure; it may belong near Umbrella.]

Genus AMATHINA, Gray, 1842.

Shell depressed, oblong; apex posterior, not spiral, with three strong ribs radiating from it to the anterior margin which is produced into three points.

Animal with elongated head, the eyes sessile on the margin behind the short tentacles; mantle margin entire, a tentacular median filament at the hind part. *Indian Ocean.*

Genus PLATYCERAS, Conrad, 1840.

Shell depressed subglobose, subovoid or obliquely subconical; spire small; volutions few, sometimes free and sometimes con-

tiguous, without columella; aperture more or less expanded, often campanulate, and sometimes with the lip reflexed; peristome entire or sinuous. Surface striated or cancellated, often spirally ridged or plicate, and sometimes strongly lamellose transversely, nodose or spiniferous.

There are fifty fossil species, Silurian to Carboniferous. *United States, Europe.* *P. ventricosum*, Conr. (S. and S. Conch., t. lxiv, f. 81, 82). As Platyceras was parasitic on crinoids and other marine organisms, the shells are very frequently deformed. The subglobose species resemble the Velutinæ, but there is every degree of variation in form between these and non-spiral shells. From among these the following groups have been rather arbitrarily separated. *Acroculia*, Phillips, 1841, is a synonym; in the opinion of some naturalists, Conrad's name (being preoccupied in insecta) should yield to this.

Section ORTHONYCHIA, Hall, 1843.

Body of the shell straight or curving, gradually diminishing above, arched or in some degree spiral at the apex, with the last volution or more quite free. *P. spirale*, Hall (S. and S. Conch., t. lxiv, f. 83).

Section IGOCERAS, Hall, 1859.

Shell cancellated and often plicate. *P. pileatum*, Conr. Silurian, *U. S.*

Section EXOGYROCERAS, Meek and Worthen, 1868.

Shell sinistrally spiral, with rudimentary columella. *P. reversum*, Hall.

[Genus DIAPHOROSTOMA, Fischer, 1885.

Under this new name, Dr. Fischer includes *Platyostoma*, Conrad (not Klein, etc.), and its section *Strophostylus* in this subfamily. I have placed it in Naticidæ, p. 9.]

[ADDISONIA, Dall, 1882.

Dr. Fischer has included this patelliform genus here on account of its lingual dentition, and the existence of a male copulatory organ; for both conchological and anatomical reasons I prefer to retain it near Fissurella.]

II.—HIPPONYCINÆ.

Genus HIPPONYX, Defrance, 1819.

Shell thick, obliquely conical, non-spiral, apex somewhat posterior and directed backwards, surface rugose or longitudinally grooved or cancellated; muscular impression horse-shoe shaped; base of attachment (opercular piece) when present, thick.

Animal oval or suborbicular, conical or depressed; foot very thin, a little thickened towards the margins; head globose, separated from the body by a neck-like constriction; eyes upon swellings of the tentacles.

Dentition, Pl. 30, fig. 6.

Distribution: Warm seas. Fossil: Cretaceous, Eocene. *U. S.*, *Europe.*

The synonyms are *Cochlolepas*, Klein, 1753; *Krebsia*, Mörch., and *Amalthea*, Schum., 1817.

The same species will either excavate a cavity to which it adheres, or secrete a testaceous support. The section *Amalthea* was formed for certain species which were supposed to differ from *Hipponyx* in not secreting a shelly base, but forming instead a cavity in the surface of shells.

Genus MITRULARIA, Schum., 1817.

Shell conical, more or less irregular with a subcentral, subposterior, subspiral apex; interior with a central, half cup-shaped lamina, open in front, free on the sides, attached at the apex; basal plate thickened.

Animal with broad muzzle, tentacles lanceolate, with eyes externally near their base, the neck lobed on either side.

Inhabits temperate and tropical seas, distribution world-wide. The synonymy includes *Cemoria*, Risso; *Mitrella*, *Trochilina*, *Trelania* and *Poculina*, Gray, 1867; *Lithedaphus*, Owen, and *Calyptræa*, Lam., 1801, not 1799. Lamarck at the later date adopted for his type a species belonging to the present group to which it has since been generally applied, whilst the name of *Galerus*, Humphrey, has been the received designation for the *Calyptræa*, Lam., of 1799. I follow Dr. Fischer in correcting this matter, and like him displace the earlier but ill-founded name of Humphrey for the latter.

[Genus HARTTIA, Walcott, 1884.

A cast indicating a patelliform shell within which extends a low broad ridge, originating at one end and supports a broad, subcordate shield-like expansion covering most of the other end. *H. Matthewi*, Walcott (Pl. 30, fig. 1), Cambrian, *St. John*, *N. B.* A group of doubtful affinities.]

The following extracts from a lecture by P. P. Carpenter, delivered under the auspices of the Smithsonian Institution, and printed in its Annual Report for 1859, scarcely require apology for their introduction here, in view of their intrinsic interest. Carpenter and Dr. Gray agree in making large reductions from the number of published species, although, as a matter of course, they differ somewhat in detail.

"The Calyptræids ('slipper' and 'cup-and-saucer' limpets) found on the Spondylus valves are the most beautiful and varied that are known in any part of the world. The shells are large and thin, delicately furrowed and as it were engine-turned, with a profusion of tubercles, which sometimes rise up into long hollow spines. The colors vary from white to a rich black-brown, or are variously mottled with sienna, while the shape may be either an elevated cone or a widely spreading disk. Sometimes the same individual will begin with one form and sculpture-pattern, and suddenly change to another; others again seem to develop permanent and widely differing varieties. Occasionally a starved or diseased Mazatlanian will present the aspect which is normal on the colder shores of South America; exchanging its thin texture and delicate sculpture for a coarse, solid, and nearly smooth shell. So far the views lately propounded with such ability by the celebrated author of the 'Voyage of the Beagle' meet with sufficient confirmation; and yet amid all its changes, there is a habit of growth, hard to describe and yet easily recognized by the practiced eye, which not only unites the most aberrant forms, but at once separates them from neighboring species found on the same coast and appearing very similar to the common observer. The ordinary plan of only preserving in collections a few picked specimens displaying marked peculiarities, is by no means favorable to the elimination of truth in reference to spe-

cific variation. These extreme forms are very naturally described as distinct species, the intermediate connecting links not passing before the view of the naturalist. On showing to a distinguished author a carefully eliminated suite of Mazatlan specimens connecting the smooth, thin, flat *Crepidula squama*, Brod., with the coarse, arched, laminated *C. Lessonii*, passing through the forms *C. nivea*, C. B. Ad., and *C. striolata*, Mke., he complained that I had 'kept all the puzzling shells.' In the very useful work of Messrs. H. and A. Adams, on the 'Genera of Recent Mollusca,' these forms appear under different subgenera. It is not fair to blame authors for these mistakes, which naturally result from the imperfection of the material on which they work. But the prevalence of such errors should lead us to embrace every opportunity of studying large numbers of specimens, both from the same and different localities. Patience, accuracy, and honesty may thus render as valuable service to science as brilliant genius, and may supply the materials from which some master-mind may hereafter develop the most important generalizations.

"Those who describe species from minute differences founded on individual specimens, might do well to study the plates appended to the 'B. A. Report on the West Coast Mollusca.' Take *e. g.* the *Crucibulum spinosum*, pl. 9. The shell is at first spiral, like a snail. It then surrounds its entire margin with a rim, which is the first beginning of what in the adult becomes the 'saucer' or outside shell; that is the hardened skins of the animal's body (for the shells are not to be regarded as a house, constructed for the animal to live in, but as an integral part of the animal itself, like the feathers of birds or our own nails and hair). At the same time it raises a slight lamina from the labium or 'pillar-lip' which ultimately becomes the 'cup.' At first, however, it is like the 'deck' in the Slipper limpets, from some species of which it can scarcely be then distinguished. The Crepidulæ, however, continue their deck in a horizontal direction, while the Crucibulum turns the edges upwards at a more or less obtuse angle. Gradually during the progress of adolescence, this angle becomes right and then acute, the outer shell meanwhile taking various forms, round, oblong, or irregular, according to the nature of the surface to which it has chosen to

adhere. Often this immature state is continued to a late period; if permanent it would belong to the subgenus Dispotæa (Say), of Messrs. Adams. But normally the sides of the cup close in, while its body becomes greatly swollen in front. This cup now assumes the form which is always characteristic of the species under every modification of external growth; being well rounded in *C. imbricatum*, angular at the side in *C. spinosum*, and with the sides flattened against each other in *C. radiatum*. In *C. rude*, the adolescent stage is very soon completed and the cup is permanently detached from the side of the shell, forming a veritable 'cup and saucer,' one too after the fashion so prevalent in America, where the cup-handle has never been formed. It is a remarkable fact in geographical distribution, that the forms *intricatum* and *rude*, which are typical in the west tropical fauna of Central America, reappear but very sparingly on the Caribbean shores; while *C. spinosum*, which is far more common, more variable and more widely distributed being found (under various names) from California to Chili has not yet been discovered on the eatern side.

"Again, the *C. radiatum*, which is the most delicately formed of the whole group, confines itself to the equatorial western seas, not having been found further north than the Panama district. An extremely remarkable specimen of *C. spinosum* was dredged by Mr. Cuming in comparatively deep water. The net brought up a large stone with a small hole in it, on looking down which Mr. Cuming perceived a number of spines, as though a sea-urchin was lodging there. A blow of the hammer discovered the existence of a large cavity within, communicating with the external world only through this narrow opening. In the hollow of this cavity lay the limpet, turned as it were nearly inside out. The creature had gone to live there when young, and being of sedentary habits, it had not occurred to him that he might be imprisoned for life by his own corpulence, else he would probably have made his escape before he had grown too large. As it was, he grew larger and larger, and as the walls of his prison rose up round him on every side, he was obliged to flatten out his shell till it became a plate, instead of a cone. At the same time, his body protruding into the hollow, the cup protruded along with it till it stood considerably

beyond the shell, of which it was normally an inside partition. Thus our Calyptræid was fixed as immovably as any Pholas, but with this difference in their condition: that the Pholas, being designed for that kind of life, is not troubled with useless heads and eyes, and, moreover, is furnished with two long pipes to convey the water to and from the mouth and gills; while the Crucibulum had eyes simply to stare at the wall in the dark, feelers to push the stone, and a long ribbon tongue, armed with hundreds of teeth, to rasp the water. And while encumbered with these unnecessary appendages he had not the benefit of water-pipes, to bring what alone this lock-jawed subject had to feed upon. For this want, however, the economy of the animal provided a remedy. The *C. spinosum* in its normal growth is either spinose or not; the flatter forms being almost always smooth. The spires are developed from prolongations of the mantle (or thin shell-bearing skin of the animal), which appear at irregular intervals, though in regular pattern. Sometimes the whole shell is covered with crowded prickles *C. hispidum*, Brod.), sometimes a few long spines appear at the edge on one side of the otherwise smooth shell. Sometimes the spines are few, large and hollow (*C. tubiferum*, Less.), each of the outer row communicating through a hole within the inner margin, which is afterwards filled up. Our prisoner worked for his living by constructing very large, long and open spine-pipes, which, instead of standing up at right angles to the shell, were directed back towards the narrow opening in the stone. It would appear that by this means the animal was simply supplied with nourishment, for the shell was above the ordinary size.

"The most common Calyptræid on the backs of our Spondylus valves, however, was *Crepidula aculeata*, Gmel. It was first described from West Indian specimens, which are generally dead and worn in collections, and afterwards re-described from fine West Coast shells, as *C. hystrix* and *C. echinus*, Brod. The stunted northern form was named *C. Californica* by Nuttall.

"Perfect specimens brought by Mr. Dyson from Honduras correspond so exactly with those from Mazatlan that it is hardly possible to resist the impression that they are identical. Specimens from South Africa, from Sydney (Australia) and from the

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Pacific Islands, also present no marks of specific distinction. It appears to be one of the ubiquitous species, of which several are found in various genera, and some are known to have existed far back in time.

"The Crepidula not only undergoes the changes of form from nearly flat to deeply arched, but from obese to elongated, which every observer of the common slipper-limpet of the Atlantic (*C. fornicata*, abundant from the icy shores of the St. Lawrence to the tropical waters of the Gulf of Mexico) knows to prevail in that species; but in sculpture it may either be crowded with short spines (*C. echinus*, Brod.), or have a few radiating lines of longer spines with nodulous interstices (*C. hystrix*, Brod.), or be covered with an irregular mass of spiny knobs (normal state), or lose the spines altogether in roughened striæ (smooth-water form), or even become almost destitute of sculpture, like some northern specimens of the stunted variety (*C. Californica*, Nuttall). Through all these changes it is recognized by its spiral stomattelloid growth exemplifying a section of the genus, the extreme forms of which approach Trochita; and by its beautifully waved deck-margin, which resembles a ⌒⌒. The pointed centre, as the shell increases in size, generally leaves a characteristic line on the surface of the deck, passing up to the vertex. But often the point is rounded off, and even degenerates into a broad wave. In one specimen co-ordinate with this degeneracy, a sharp angle was abnormally formed on one of the sides, so as to give the margin the aspect of a brace turned the wrong way, thus ⌒⌒; a very good specific distinction, if no intermediate specimens had been found. A series of deck-margins belonging to this and the following species, will be found represented on plate 8 of the British Association Report, Fig. 1, f. 3, g. The best means of distinguishing the species of slipper-limpets from each other was found to be the shape of the nuclear portion and the mode of growth of the very young shell. Whatever be the abnormal character of the adult, it did not appear that the offspring had a tendency to the same degeneracy, but rather to the resumption of the normal type. In the case of local varieties, the peculiarities are reproduced, because they depend on circumstances which affect all alike. But in such cases as those under consideration, where the extremes and all the

intermediate forms of variation are found in the same locality, the changes depending on the accidents of individuals, it is not yet proved that the idiosyncrasies are transmitted. In fact, the frequent instances in which the individual itself changes its form and sculpture at different periods of its life, is against such a hypothesis.

"It is a fact worth noticing that while some species of shells are extremely variable, others, inhabiting the same localities, are very constant in their characters. These are seldom widely diffused, and are often rare in individuals. A few young specimens of such species were found among the slipper-limpets on the spondyli; but the bulk of the specimens belonged either to *C. aculeata*, which, as we have seen, is a somewhat ubiquitous species, or to *C. nivea*, which, under many shapes and many names, spreads over the principal parts of the Pacific coast of America, representing there the very distinct *C. fornicata* of the Atlantic. Two extreme forms were described by Broderip, from Mr. Cuming's collection; the one, *C. squama*, thin, flat, and smooth; the other, *C. Lessonii*, solid, often arched, and covered with concentric laminæ. These sometimes appear at regular intervals, and seem to be the normal and unique sculpture of the shell. It appears, however, that *C. squama* (which is the calm-water form), if exposed to rougher influences, arches its back, adds layer after layer of porcellanous matter, hiding the color rays, and leaving the margin like the edge of a quire of paper. Now, if co-ordinate with this laying on of extra coats, the creature advances forward, turning up the previous portion, the form *Lessonii* is produced; in general very roughly and irregularly, which is the *C. striolata* of Ménke, but sometimes very delicately, with fine sculpture between the laminæ as described by Brod. It is common to find shells living for some time as *squama*, and suddenly plunging into the *Lessonii* types, with one or two strong laminæ. Every stage of intermediate form was found among the Mazatlan shells. The degraded specimens of the Chilian seas form a part of the *C. protea* of d'Orbigny—a convenient receptacle, as the type specimens in the British Museum show, for the dead and puzzling shells which the author did not know where else to place. The ordinary condition, intermediate between the extremes first described, is *C.*

nivea of C. B. Adams. As it is the normal state, the usual rules of priority have been set aside, and *C. nivea* taken for the name of the species, leaving *squama* and *Lessonii* for the principal varieties. The White Slipper is known under all forms (when in good condition), by its shaggy, light-green skin, and by the very peculiar character of the nuclear whirls. These are remarkably small, though the shell is large, standing out from the surface, of a reddish tinge, and crowded with regular transverse ribs. The characters have been observed in specimens of all the forms, although the influences which produce *Lessonii* drawing the shell away from the vertex, generally lead to its abrasion. Sometimes the White Slipper goes to live, when young, into the empty burrow of a boring mussel. In these cases, as soon as it has grown to the width of its cave, it is obliged to develop itself longitudinally, at the same time turning up its sides in the vain attempt to get more room. The corresponding slipper limpet of the California coast appears to have a special fancy for this mode of life, as most of the specimens sent have assumed the form now described. It was first found by Mr. Nuttall, and distributed by him a *C. exuviata*. It was so published in Dr. Jay's catalogue. Dr. Gould, however, figured and described it as *C. explanata*. It had been previously figured by Valenciennes, in the Voyage de la Venus, as *C. perforans*, that author supposing that it had made the burrow in which it was found. The designation representing an untruth, it must yield to the latest name, which alone is accompanied by a description. A very singular groove, not found in the Mazatlan specimens, appears in all the specimens of *C. explanata*, and gives name to the shell. It is, however, a mere accident of growth, differing in every individual, and often not appearing till the animal approaches maturity. A specimen in situ, in the Smithsonian Institution, fortunately reveals the cause of this unique appearance. The creature goes to live in at the outer or pipe-end of the burrow of a bivalve, which remains at the other end after the animal has perished. The growth of the shell is normal till it has attained the breadth of the pipe, be that greater or less. It then increases down the pipe, the vertex of the shell being always turned towards the outer end. There is no groove at this period of its growth, and when the vertex is rubbed off

(as it generally is in elongated specimens), it can hardly be distinguished from similar specimens of the White Slipper. But as soon as it has reached the bottom of the pipe, where the dead bivalve (generally a Petricola, a creature with rather short siphons), still remains undecomposed, it suddenly encounters an unexpected obstacle. It wedges itself under this (to it) mighty globe, and turns its delicate mantle, exuding the shelly skin up the sides of the cavity, but in vain. There is nothing for it but to retrace its steps, and back out. As it does so, every new portion formed under the arched bivalve repeats the previous concave impression, and the grooved slipper is the result. The sharp instrument of the explanation of one author, and the "perforation" of the other, is nothing but the little rounded "clam" tightly wedged at the bottom of its burrow; and the same slipper-limpet freely developed under unconstrained influences, is probably the *C. navicelloides* of Nuttall, to ascertain the characters of which we are still in want of perfect specimens.

"To return to the White Slipper on the back of our Thorn Oyster. Among the young shells which appear to the naked eye to be the young *C. nivea*, were some which under the microscope displayed a much larger but smooth and imbedded nuclear portion. On comparing these with similarly situated specimens from the west coast of Africa and from other places, I found them exactly identical. They probably belong to the *C. unguiformis* of Lamarck. Now, it so happens that Prof. C. B. Adams, who in general described every shell of Atlantic types as a new species, if found on the Pacific coast, in this one instance felt constrained to adopt the Lamarckian name for the unguiform Slippers of Panama. It is not certain that in this one instance he was correct. Some of the specimens he distributed under the name are undoubtedly compressed and inverted forms of his own *C. nivea;* for every species may take the form of *unguiformis* when grown inside of a dead spiral shell, especially with a dead hermit crab pressing against it. But there seems sufficient evidence to believe that while each coast has its special species of slipper-limpets, each one of which assumes protean changes, there is in this one species which has been scattered, it may be in dead shells, and on ballast, round the world, and to be distinguished from all neighboring species by the peculiar

character of the nuclear whorls. It is too much the custom among collectors, and even among naturalists, to examine and preserve only well-conditioned adult specimens. More may often be learned from deformed and 'ugly' shells; and especially from series in all ages of development."—PHILIP C. CARPENTER.

In preparing the following pages I have made use principally of:

W. J. Broderip. Descriptions of some new Species of Calyptræidæ. Trans. Zool. Soc. London, I, 3 colored plates. 1835. This is almost a monograph of the family.

Lovell A. Reeve. Conchologia Iconica. Monographs of Calyptræa, Crepidula, Crucibulum, Trochita. 1858.

G. B. Sowerby. Thesaurus Conchyliorum. Monograph of the family Calyptræidæ. 1883.

J. E. Gray. Notes on the specimens of Calyptræidæ in Mr. Cuming's Collection. Proc. Zool. Soc. London. 1867.

Genus CRUCIBULUM, Schum., 1817.

C. SCUTELLATUM, Gray. Pl. 31, figs. 13–24; Pl. 32, figs. 25–38; Pl. 33, figs. 39–43.

Shell solid, chestnut-brown or pale, with brown rays, polished and often darker colored within, rudely radiately ribbed, coarsely latticed by concentric ribs, or smoother and closely radiately striated. Length, 2–2·5 inches.

West Coast of America from Chili to Mazatlan.

Varies greatly in sculpture, height, etc., giving rise to many synonyms. The type form has been described as *C. imbricatum*, Brod. (fig. 17), and the synonymy embraces *C. corrugatum*, Carp. (figs. 18, 19), *C. rugosum*, Lesson, *C. dentatum*, Menke, *C. costata*, Menke, *C. Cumingii*, Carp., *C. extinctorium*, Sowb., *C. rude*, Brod., *C. gemmacæa*, Val., *C. pectinatum*, Carp. (fig. 24), *C. umbrella*, Desh. (fig. 20) = depressed specimens, and *C. planata*, Mörch. *C. concameratum*, Reeve (figs. 21, 22), and *C. serratum*, Brod. (fig. 23), are young shells.

Var. QUIRIQUINA, Lesson. Pl. 32, figs. 30, 31.

Finely radiately costulate, or smooth. Mutations of this form have been called *C. trigonale*, Ads. and Reeve (fig. 25), *C. ferrugineum*, Reeve (fig. 26), *C. lignaria*, Brod. (figs. 27, 28), *C. tenue*, Brod. (fig. 29) and *C. spectrum*, Reeve (figs. 30, 31).

Var. AURICULATUM (Chemn.), Auct. Pl. 32, figs. 34, 35.

Whitish or light brown, brown-speckled or unicolored, depressed, rugosely irregularly radiately ribbed.

West Indies.

It can scarcely, except by locality, be distinguished from flat specimens from the West Coast, yet the flatter rude form is predominant in the West Indies, whilst in the former localities it is exceptional. The synonymy includes *C. Cuvieri*, Desh., *C. planatum*, Schumn., *C. Caribbeense*, Carp.

Var. VIOLACEUM, Carpenter. Pl. 32, figs. 36, 37.

Ribbed and colored like the preceding species, interior light violaceous or violaceous brown.

Ceylon.

Var. TUBIFERUM, Lesson. Pl. 32, figs. 32, 33, 38; Pl. 33, figs. 39–43.

Closely radiately striated, distantly radiately costulate, the riblets prickly with short or long tubular hollow processes.

West Coast of America, Chili to California.

Typical specimens of this form might readily be distinguished as a species, but the intermediates connect it with var. *quiriquinum*. It is better known under the later name of *C. spinosum*, Sowb. (fig. 38). Other synonyms are *C. cinereum*, Reeve (fig. 39), *C. hispida*, Brod. (fig. 42), *C. Peziza*, Gray, var. *compressoconicum*, Carp., *C. maculatum*, Brod. (fig. 43), and *C. striatum*, Brod., not Say (= *C. auritum*, Reeve, figs. 32, 33), the last two variations connecting with the smooth or finely striate variety.

C. STRIATUM, Say. Pl. 33, figs. 44, 45.

Aperture orbicular, apex usually rather high, beaked, surface radiately striate, cup broadly open, attached fully one-third of its circumference; brownish white, brownish within.

New England to New Jersey.

The type of the section Dispotæa, Say, which has no claim to be separated from the main group.

C. RADIATUM, Brod. Pl. 33, figs. 52, 53.

Conically orbicular, whitish rayed with dark chestnut without and within, radiately striated and very closely finely ridged; internal appendage cup-shaped, produced, concavely compressed on one side.

Bay of Caraccas.

Broderip describes the cup as "pressed in on one side, adhering to the shell not only by its apex, but also by a lateral seam, which scarcely reaches to the rim of the cup." A doubtful species.

Section BICATILLUS, Swainson, 1840.

C. EXTINCTORIUM, Lam. Pl. 33, figs. 46–51.

Thin, shining, smoothish, apex elevated and twisted; brownish white, more or less rayed or spotted with chestnut; interior appendage small, cornucopia-shaped.

Malacca, Singapore, Mauritius.

It is *C. lævigatum* of Chenu, *C. morbidum*, Reeve (figs. 48, 49), and *C. lividum*, Reeve (figs. 50, 51), a brown variety.

C. VERRUCOSUM. Reeve. Pl. 33, figs. 54, 55.

Shell orbicular, conical in the middle, top central, somewhat mamillary, yellowish cream-color, rather opaque, more or less rayed and spotted with chestnut, surface interruptedly laterally wrinkled; cup small, cornucopia-shaped.

Yucatan (Norman).

Described without locality, which is supplied from specimens in Mus. Philad. Acad.

C. MAMMULA, Rochebrune. (Unfigured.) *Senegambia.*

Genus CALYPTRÆA, Lamarck, 1799.

C. SINENSIS, Linn. Pl. 34, figs. 56, 57; Pl. 30, fig. 7.

Orbicular, thin, smooth or finely scaled, shining within; white or yellowish white.

Europe.

Dr. Jeffreys writes: "It would seem that this mollusk seldom, if ever, leaves its place of abode. I found some at Sark, living attached to small pebbles, each pebble having scarcely a broader surface than the circumference of the shell, which closely fitted the sinuosities of the stone. Both shell and pebble were en-

crusted by mullipore, and had the same appearance. The mark of adhesion is glossy, but does not show any excavation. According to Andouin and Milne-Edwards the female hatches her eggs, and keeps the fry between her foot and the foreign body to which she adheres; her patelloid shell thus serves not only to cover and protect herself, but is also a shield for her offspring. The eggs are yellow, and inclosed in membranous capsules, which are flattened, transparent, and filled with an albuminous matter. These little sacs are from six to ten in number, connected one with another by a pedicle, and arranged like the petals of a rose; each capsule contains ten to twelve eggs. The fry resembles that of *Velutina lævigata* in shape and sculpture; and the animal at this stage of growth has large ciliated neck-lobes, as in other Gastropoda."—*Brit. Conch.*, iii, 275.

It is *C. vulgaris*, Phil.; *C. squama*, Desh.; *C. mamma*, Siemaschko; *C. lævigata*, Lam.; *C. muricata*, Costa; *C. spinulosa*, Chemn.; *C. albida*, Donov.; *C. succinea*, Risso; *C. Polii*, Scacchi; *C. spirata*, Nardo; *C. carinaria*, Bon., besides a number of fossil synonyms.

C. SUBREFLEXA, Carpenter. Pl. 34, figs. 58, 59.

Reddish brown, aculeately radiately striated; internal appendage lateral, appressly effused.

Gulf of California.

C. PELLUCIDA, Reeve. Pl. 34, figs. 60, 61.

Depressed orbicular, pellucid, finely concentrically striated; livid white; internal appendage rather depressly septum-shaped.

Philippine Islands.

C. CONICA, Brod. Pl. 34, figs. 62, 63.

Rather thin, concentrically striated; yellowish white, radiately subtessellately marked with chestnut, interior bluish white with the markings chestnut-violaceous; internal appendage diaphanous, thin, effused.

West Columbia to Acapulco.

C. MAMILLARIS, Brod. Pl. 34, figs. 64–75, 78–81.

Rather thin, smooth, with growth-lines; whitish, becoming purplish or brownish purple on the spire, the mamillary apex brownish; interior light brownish or violaceous.

Valparaiso, Panama, Mazatlan, Sta. Barbara, Cal.

Payta to Guayaquil (d'Orbigny).

The synonymy includes *C. regularis* and *C. aspersa* (figs. 80, 81), C. B. Ad., *C. Lamarckii*, Menke, *C. lorica*, Brod. (Gray), *C. fastigiata*, Gould (figs. 66, 67), from Puget Sound, *C. solida*, Reeve (figs. 68, 69), *C. lichen*, Brod. figs. 70, 71), *C. unguis*, Brod. (figs. 72, 73), a distorted young specimen, and *C. poculum*, Reeve (figs. 74, 75) = *C. fusca*, Carp., both young specimens.

C. clypeolum, Reeve (figs. 78, 79) = *C. Magellanica*, Gray, said to come from Straits of Magellan may be added.

C. CANDEANA, d'Orb. Pl. 34, figs. 76, 77, 82, 83.

Small, rounded, thin, spire elevated, growth-lines rugose, sometimes obsoletely finely radiately striated, white.

West Indies.

It is *C. occidentalis*, Gray, and *C. Chinensis*, Guilding. *C. lamellosa*, A. Ad. (figs. 82, 83), does not appear to have any distinctive character.

Unfigured Species.

C. PARVULA, Dunker.	*West Indies.*
C. CONTORTA, Carp.	*California.*
C. DECIPIENS, Phil.	*Sts. Magellan.*
C. SELLA, Menke.	*Hab. unknown.*
C. VESTITA, Phil.	*Hab. unknown.*
C. SPINIFERA, Gray.	*Kurrachee.*
C. RADIATA and C. RADIOLA, Desh.	*Hab. unknown.*
C. ARIETINA, Rochebrune.	*Senegambia.*

Subgenus INFUNDIBULUM, Montfort, 1810.

C. RADIANS, Lam. Pl. 35, figs. 84–88.

Orbicular, depressed, or elevated radiately subnodulously ribbed; whitish or yellowish white, under a yellowish brown fibrous epidermis, interior white, more or less stained with chocolate, the septum white. Diam. 2–3 inches.

Peru, Chili.

The synonyms are *C. Peruviana*, Desh., *C. concamerata*, Mart., *C. costellata*, Phil., *C. Trochiformis*, Gmel., *C. Trochoides*, Dillw., *C. Araucana*, Lesson, *C. sordida*, Brod. (fig. 86), a young shell, *C. spirata*, Forbes (fig. 87), a darker colored specimen, said to come from the Gulf of California, but the habitat has not been confirmed, although probable, and *C. corru-*

gata, Reeve (fig. 88). A specimen of this species was collected (dead) at the island of Inagua, Bahamas, by Dr. J. J. Brown, and is in the museum of the Philadelphia Academy.

C. INTERMEDIA, d'Orb. Pl. 35, figs. 89, 90.

Orbicular, thin, whitish, longitudinally costate, inner margin of the lamina reflected over the blade.

Peru.

I know nothing of this shell, said to be rare. Is it an aberrant young *C. radians*?

Unfigured Species.

C. SCUTUM, Lesson (C. TENUIS, Gray said to be a syn.).
N. Zealand.

C. VENTRICOSA, Carp. (= C. RADIANS?) *Mazatlan.*

C. PHLYCTIPHERA, Rochebrune. *Senegambia.*

Subgenus SIGAPATELLA, Lesson, 1830.

C. PILEOLUS, d'Orb. Pl. 35, figs. 91, 100.

Thin, smooth, with revolving distant riblets, thin, diaphanous, white.

Patagonia, Falkland Is.

C. HELICOIDEA, Sowb. Pl. 35, figs. 92, 93.

Whorls oblique, divaricately costate, orange-brown.

Hab. unknown.

C. LATERALIS, Sowb. Pl. 35, figs. 94, 95.

Divaricately rugosely ribbed, whitish stained and radiated with chestnut.

Hab. unknown.

C. CALYPTRÆIFORMIS, Lam. Pl. 35, figs. 96–99.

White or yellowish white, marked by growth-lines, spire often light violaceous, covered by a thin fibrous yellowish epidermis, interior white, more or less stained or blotched with violet.

Australia, New Zealand, ? Viti Is., etc.

Lamarck described this species as a Trochus, and Deshayes in removing it to the genus Calyptræa, changed the specific name to *Lamarckii*. I have thought it best to restore the original name, although rather objectionable. In no case could Deshayes' name be used, for the next in priority is Sowerby's equally objectionable *C. comma-notata*; then follow *C. Novæ-Zelandiæ*,

Lesson, *C. tomentosa* (figs. 96–98), and *C. maculata* (fig. 99) of Quoy. It is also *C. Chinensis* of Chenu, not Linn.

Genus CREPIDULA, Lam., 1799.

The slipper-limpets are quite as variable as either of the preceding groups, and the definitive arrangement of the species will require continued observation of the growth of shells from the same brood under diverse conditions. I take the species as conventionally recognized, although fully aware of some facts which, at least, militate strongly against the retention of some of them. As in most attached genera the form and sculpture are influenced by the surface of attachment; thus a species flat and suborbicular when attached to a similar surface will become high and compressed if growing on the spire of a narrow-whorled shell.

C. unguiformis, Lam., is generally found on the inside of large univalve shells, such as Naticas, Fulgurs, etc., and has the upper surface concave, and the color white; and Gray thought that the same species became *C. fornicata*, Gmel., convex, with radiating chestnut spots, when attached externally; but *unguiformis* whilst appearing to prefer the interior station, yet is sometimes found on the outside of shells, still preserving its white color and long shape, but becoming somewhat convex.

The admitted cosmopolitan distribution of *C. unguiformis* points to a large geographical range in the other species; yet the protected station usually chosen by that species is probably conducive to its spread and acclimation.

Gray writes (Zool. Proc., 737, 1867): "Messrs. H. and A. Adams formed the genus *Ianacus* for the white flat specimens of this genus. All the specimens of the different species that take up their residence in the inside of the shell assume this form and color. It has been suggested that, instead of being dependent on the accident of locality, their living in such places is a habit peculiar to the species, and a proof that they are of a distinct kind. This theory is set at rest by the fact that some specimens of the shell show the two states; that is to say, an animal growing on the outside of a shell has moved to the inside, and an animal that commenced life on the inside of a shell has

moved to the outside. In the first case the apex of the shell is convex and brown, and the circumference white and flat; in the other the apex is flat and white, and the circumference brown and convex. I have seen one specimen in which the animal has moved twice, and the shell has a brown tip and margin and a white flat intermediate space."

I have seen many thousands of specimens of the American *C. fornicata* and *C. unguiformis*, but never noticed any showing the change above recorded.

The spinous ribbing of *C. aculeata* is very probably not a specific character, yet it occurs in connection with a general facies which is easily recognizable as specific, although not readily definable.

C. FORNICATA, Linn. Pl. 36, figs. 1–8.

Smooth, whitish or pink white, with radiating irregular chestnut lines often broken up into spots, interior more or less stained with brown or violaceous. Length, 2 inches.

East Coast of United States from Maine to Florida; West Indies, Brazil, etc.

I figure a ribbed specimen (fig. 2). The synonymy includes *C. gibbosa*, Defrance; *C. nautarum* (Humph.), Mörch; *C. Riisei*, Dunker; *C. maculosa*, Conrad; *C. depressa*, Say, has been referred to *C. unguiformis*, Lam., but specimens presented to the Philada. Academy by Mrs. Say are young *fornicata*. *C. protea*, d'Orb., includes this species and *C. unguiformis*, and is said to extend from West Indies to Patagonia. I am somewhat in doubt as to the West Coast distribution of this species as assumed by Dr. Gray. Most of the Pacific forms which that naturalist has associated with *C. fornicata* appear to me distinguishable by perhaps slight, but sufficiently recognizable characteristics; *C. arenata*, Brod. (figs. 4, 5), however, said to occur at St. Elena, West Columbia, where it was obtained by Cuming, appears to be absolutely identical, and *C. Patagonica*, d'Orb. (figs. 6, 7), differs only in being more rounded in outline (in the figure) than the usual form of *fornicata*. *C. Aplysioides*, Reeve (fig. 8), from Rio Janeiro, may be added. The shell which Reeve has figured under the name of *C. nautiloidea*, Lesson, also appears to be referable here.

C. GLAUCA, Say. Pl. 36, fig. 9.

Rather flat, with a sharp pointed apex, yellowish brown with radiating rows of chestnut spots, interior dark chestnut brown, more or less mottled or spotted, septum white, diaphanous.

Length, ·75 inch.

Long Island Sound to *North Carolina.*

The darker color and smaller size distinguish this from the preceding species, but I am not at all sure that it is more than a varietal state of the young shell. Reeve's figure probably represents a colorless *C. fornicata.*

C. CONVEXA, Say. Pl. 36, fig. 10.

Convex, with somewhat trigonal outline, high back and obliquely beaked apex; whitish or glaucous radiately lined with chestnut spots, with sometimes larger nebulous chestnut-purple markings. Length, ·75 inch.

Nova Scotia to Florida.

The form of this species is due to its attachment on the crustacean *Eupagurus longicarpus* and the gastropod *Ilianassa obsoleta.* The preceding species has been supposed identical with this, and simply modified by attachment to broad flat surfaces; this may be so, yet the present is a smoother, lighter-colored heavier shell. Its identity with *C. fornicata* is not improbable. *C. navicula* (Dunker), Mörch; a West Indian form, insufficiently described, and unfigured, is probably a synonym.

C. ADSPERSA, Dunker. Pl. 36, figs. 11, 12.

Ovate, more or less convex, rugulose, white with chestnut spots, epidermis olivaceous. Length, 1 inch.

Benguela.

Possibly a form of the last species.

C. LENTIGINOSA, Sowb. Pl. 36, figs. 13, 14.

Yellowish chestnut-colored, with purple chestnut radiating series of spots. Length, 1 inch.

Cape of Good Hope.

Perhaps identical with *C. convexa*, Say, and the last species.

C. CAPENSIS, Quoy. Pl. 36, figs. 15, 16.

Suborbicular, flattened, radiately, obsoletely striated, chestnut-brown, brighter colored within. Length, 1·25 inches.

Cape of Good Hope.

This species differs in form from the last as *C. glauca* does from *C. convexa.*

C. PORCELLANA, Linn. Pl. 37, fig. 22.

Apex slightly beaked, whitish, maculated and divaricately stained with purplish chestnut spots. Length, 1·25 inches.

Senegal; Indian Ocean?

It is very doubtful whether this is distinct from *C. fornicata;* a sharper apex and divaricating color-lines appear to be its chief points of difference.

C. MOULINSI, Michaud. Pl. 36, fig. 17.

Oval, depressed, smooth or slightly rugose, chestnut-brown. Length, 1–1·25 inches.

Mediterranean Sea.

Is *C. fornicata*, Phil., and *C. gibbosa*, Desh. Dr. Jeffreys and other good authorities consider this to = *C. fornicata.*

C. LESSONII, Brod. Pl. 36, figs. 18–21; Pl. 37, figs. 22–25.

Rather flat, concentrically laminarly frilled, frequently radiately costulate, white, sometimes radiately lineated with chestnut. Length, 1 inch.

West Coast of Central America to Monterey, Cal.

C. fimbriata, Reeve (figs. 20, 21), said to come from "Vancouver's Straits," *C. squama*, Brod. (fig. 23), *C. nivea*, C. B. Ad., *C. striolata*, Menke, and probably *C. navicelloides* and *C. exuviata*, Nutt., *C. explanata*, Gould (figs. 24, 25), and *C. perforans*, Val., are synonyms. *C. explanata* has the form of *C. unguiformis*, but Carpenter places it here.

Carpenter (Mazat. Cat., 281), describing this species under Prof. C. B. Adams' name of *C. nivea*, writes as follows concerning it:

"This creature, when flat and finely grown, is the *C. squama* of Broderip. The same shell, when coarsely grown, more convex and without brown stripes, is *C. nivea*, C. B. Ad. When the layers of which it is composed, instead of lying regularly one over the other, are slightly prominent, it becomes *C. striolata*, Menke. When they are drawn forwards and project it becomes *C. Lessonii*, Brod. The name of Prof. Adams is retained, in preference to the prior ones of Broderip and Menke, as representing the normal condition of the shell.

"In the *squama* stage it appears as a very thin, flat shell; with the vertex generally lustrous brown, sometimes white; from this radiate a greater or less number of brown lines, sometimes more or less broken into dots, gradually losing themselves in the white texture of the shell, sometimes reappearing at the margin, sometimes altogether absent. Very rarely a rich lustrous brown is developed inside, shading into a sea-weed green. The shell is covered with a copious yellowish green epidermis, which lies in a fringe round the sharp margin. In its ordinary state, the texture has a tendency to run into layers. The epidermis does the same, the layers being in shreds and very copious."

C. DORSATA, Brod. Pl. 37, figs. 26–30; Pl. 38, fig. 41.

Thin, wide, irregularly longitudinally corrugated or rudely ribbed, or smoothish, whitish or yellowish, sometimes violaceous within; septum bilobed. Length, ·75 inch.

Mazatlan to California.

So distorted is this species in some instances that the apex is somewhat distant from the margin, and the attachment of the septum is lateral, so that it was described as a Calyptræa.

C. bilobata, Gray (figs. 26, 27), is a smooth, chestnut-rayed form of this species; *C. lingulata*, Gould, is described from a worn specimen of it. *C. foliacea* (fig. 28), and *C. strigata* (figs. 29, 30), Brod., referred by Carpenter to the next species, appear to me more likely to belong here, if they are not *C. aculeata*, Gmel.

C. DILATATA, Lam. Pl. 37, figs. 31–34; Pl. 38, fig. 42.

Oval, broad, rather thick, smooth, but with distinct growth-lines; whitish, under a yellowish brown, thin epidermis, interior white, but the margin usually stained or radiately lineated with chestnut; apex much curved to the side of the shell.

Length, 1·5–2·5 inches.

Western Coast of America from Patagonia to Alaska; Kamtschatka.

Distinguished by its rugose growth, inflated form, interior marginal coloring. The synonymy is very large: *C. depressa*, Desh., *C. Peruviana*, Lam., *C. patula*, Desh., *C. Adolphæi*, Lesson, *C. nautiloides*, Lesson, *C. pallida*, Brod. (fig. 32), *C. arcuata* (Brod.), Orb., *C. princeps*, Conr., *C. prærupta*, Conrad,

C. grandis, Midd. (fig. 33), *C. minuta*, Midd. (fig. 42), and *C. nummaria*, Gould (fig. 34), the latter from the interior of shells, hence flattened. It appears to me that *nummaria* might as well be referred to *C. Lessoni* as here, and that *C. explanata*, which is placed in the synonymy of *C. Lessoni*, could also be equally well placed here; further, these flat, interior-growing specimens of Crepidula from the West Coast have about as much right to a distinctive place as has *C. unguiformis*.

C. MONOXYLA, Lesson. Pl. 37, figs. 35, 36.

Whitish, elongated, contorted, high-convex.

Length, 1·25–1·5 inches. *New Zealand.*

This species does not appear to have any special characteristics; a *C. unguiformis* growing on the *outside* of a narrow shell would be apt to take on the same form. *C. contorta*, Quoy (figured), and *C. profunda*, Hutton, are synonyms.

C. ONYX, Sowb. Pl. 37, figs. 37, 38; Pl. 38, figs. 43–50; Pl. 39, fig. 59.

Rather thick, rugose, smooth or rarely radiately costellate, chestnut or chocolate-colored within and without, sometimes obscurely chestnut-rayed, the septum usually white.

Length, 1·5–2 inches. *Panama to California.*

Carpenter, in his Mazatlan Catalogue, endeavors to distinguish *C. rugosa*, Nuttall (fig. 37), from this species; the latter having a shaggy epidermis, whilst that of *rugosa*, though somewhat lamellar, is glossy, never shaggy. The numerous specimens before me, from many localities, do not seem to establish this distinction, and probably the shaggy epidermis is the result of rough water. I suspect that *C. adunca*, Sowb., with its sharp elevated beak, although placed from this character in a distinct section, will prove to be an *onyx* growing upon more restricted surfaces.

The synonymy will include *C. hepatica* (fig. 38), perhaps of Deshayes, at any rate, of C. B. Adams; but whether the *C. hepatica* so identified by Krauss, or his var. *complanata* (fig. 45), from the Cape of Good Hope, are identical, remains doubtful: I can see no difference, judging from the figures. *C. immersa*, Angas (figs. 46, 47), from Australia, also appears the same. To

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these are to be added *C. amygdalus*, Val., *C. Cerithicola*, C. B. Ad. (juvenile), *C. marginalis*, Brod. (figs. 48, 49), *C. lirata*, Reeve (fig. 50), and perhaps *C. Sitchana*, Midd. (fig. 59).

Section GARNOTIA, Gray, 1867.

C. ADUNCA, Sowb. Pl. 38, figs. 51–55; Pl. 37, figs. 39, 40; Pl. 39, fig. 60.

Usually rather high, compressed on the sides, or subtriangular with a sharp hooked beak distant from the margin, smoothish, chestnut-brown, under a light yellowish brown epidermis, with sometimes indistinct rays, more or less broken up into spots, interior also chestnut color. Length, 1 inch.

Panama—Sts. of Fuca.

A very common West Coast form, the distinctive character of which may result mainly from its attachment; the coloring does not differ from *C. onyx*. The synonyms are *C. solida*, Hinds (fig. 52), *C. rostriformis*, Gould (figs. 53, 53 *a*), *C. uncata*, Menke, *C. fissurata*, Sowb. (fig. 60), and *C. rostrata*, C. B. Ad. *C. excavata*, Brod. (figs. 54, 55), is a large form, a variety of which has been named *fusco-punctata* by Mörch. *C. incurva*, Brod. (figs. 39, 40), is normally radiately ribbed, but intermediates occur between it and the smooth typical form.

Section CRYPTA (Gray), Fischer, 1885.

C. ACULEATA, Gmel. Pl. 39, figs. 61–65.

Oval, moderately convex, apex lateral, spiral, surface covered with radiating prickly or spinose ridges; whitish, yellowish or brownish, often chestnut-rayed, interior often splotched or rayed with chocolate, septum white. Length, 1–1·5 inches.

Florida to *Patagonia*, and *West Coast of America* northwards to *Southern California*, *Sandwich Islands*, *Japan*, *Australia*, *Mauritius*, *India*, etc.

A cosmopolitan species, varying in the development of the spines, and with a considerable synonymy: *C. echinus* (fig. 63) and *C. hystrix* (fig. 64), of Broderip, *C. Californica*, Nuttall, MS., *C. costata*, Menke (fig. 65). *C. strigata* and *C. foliacea*, Brod., which I have referred to the synonymy of *C. dorsata*, may possibly belong here.

Section IANACUS, Mörch, 1852.

C. UNGUIFORMIS, Lam. Pl. 39, figs. 66–68.

Narrow, upper surface, usually flat or concave, with apex direct and marginal, somewhat lamellar, milk white, interior highly polished, the septum convex. Length, 1 inch.

Nova Scotia to Texas, West Indies, Mediterranean Sea, Peru, Panama to California, Australia, New Zealand, Singapore, etc.

It is *Patella crepidula*, Linn., *C. Italica*, Defrance, *C. calceolina*, Defrance, *C. Deshayesii*, Folin (figs. 67, 68), *C. plana*, Say, *C. sinuosa*, Turton, *C. candida*, Risso. Some authors have contended that the European *C. unguiformis* is a different species from our *C. plana;* the comparison of large suites of both will demonstrate their identity to any one.

Section SIPHOPATELLA, Lesson, 1830.

C. WALSHII, Hermannson. Pl. 38, figs. 56–58.

Transverse, concave, white, beak lateral, internal appendage oblique, inflected at the outer side. Width, 1·25 inches.

Ceylon, Singapore, China Sea, Japan.

It is *C. plana*, Ads. and Reeve, not Say, *C. scabies*, Reeve (fig. 58).

C. CHINENSIS, Gray. Pl. 39, figs. 69–71.

Spiral, with one and a half or two whorls, pale brown or whitish, internal plate thin with a lateral fold.

China.

Possibly identical with the preceding species and presenting a more free growth of it. It is the type of Gray's group Noicia.

Unfigured and Undetermined Species.

C. CALYPTRÆIFORMIS, Desh.	*Peru.*
C. NERITOIDES, Recluz.	= Genus Latia.
C. SUBSPIRATA, Blainv.	*Hab. unknown.*
C. RUGULOSA, Dunker.	*Cape Good Hope.*
C. NAVICELLA, Lesson.	*Hab. unknown.*
C. CHILIENSIS, Lesson.	*Chili.*

C. LAMELLOSA, A. Ad.	*Japan.*
C. COSTULATA, Dunker.	*Hab. unknown.*
C. LINEOLATA, Desh.	*Southern Seas.*
C. STRIGILLATA, Dunker.	*Hab. unknown.*
C. EXCISA, Phil.	*Ins. Mergui.*
C. ATRA, Phil.	*Hab. unknown.*
C. GOREENSIS, Desh.	*Senegal.*
C. HOLURTHII, Perry.	
C. TEGULICIA, Rochebrune.	*Senegambia.*

Genus CAPULUS, Montfort, 1810.

C. HUNGARICUS, Linn. Pl. 39, figs. 72–74.

Shell cornucopia-shaped with recurved apex, rather thin, finely irregularly ribbed, disappearing towards the margin, growth-lines conspicuous, irregular, undulating the surface of the shell; yellowish white to dull reddish brown, under a thin yellowish brown epidermis, which is easily detached and seldom remains on the upper part, interior white or pinkish.

Diam. 1·5–2 inches.

Europe; off Martha's Vineyard, Mass., 69 and 458 fms.

In British waters it is found in from 7 to 85 fathoms, attached to rocks and large shells, especially frequenting oyster and scallop beds. It is a common tertiary fossil.

The synonymns are *C. Ungaricus*, Lam., *Pileopsis militaris*, Linn. (juv.), *C. unguis*, Sowb., *C. dispar*, Michelotti, *Protomedea ornata*, Costa.

C. UNGARICOIDES, d'Orb. Pl. 40, figs. 82, 83.

Rather depressed, very thin, fragile, summit lateral and spiral; surface of the shell entirely smooth, but the epidermis has some radiating raised lines; rosy white with a few reddish rays.

Diam. 15–22 mill. *Payta, Peru.*

C. INTORTUS, Lam. Pl. 39, figs. 75, 76.

Thin, very obliquely spiral, finely longitudinally rugosely costulate, somewhat obsoletely decussated by the growth-sculpture; aperture rounded; white, the epidermis yellowish brown, hairy. Length, 17 mill.

Florida, West Indies, Paumotus, Philippines, Mauritius.

A species having a wide distribution in warm seas. It is ? *C. militaris*, Wood, *C. incurvus*, Gmel., *C. liberatus*, Pease (fig. 76).

C. BADIUS, Dunker. Pl. 39, figs. 77, 78.

Laterally compressed, obsoletely radiately costulate, orange-brown. Length, 15 mill.

Japan.

Has somewhat the aspect of a Hipponyx.

C. SAGITTIFER, Gould. Pl. 39, figs. 79, 80.

Smooth, thin, translucent white, with minute arrowhead-shaped markings of more opaque white, arranged in quincunx order. Diam. 6 mill.

Hab. unknown.

C. VIOLACEUS, Angas. Pl. 39, fig. 81.

Laterally compressed, radiately striated, apex free, inclined to the right; internally with a very narrow rib, rounded at the edge, situated in the cavity of the shell and extending on either side nearly to the interior of the aperture; interior violaceous. Length, 16 mill.

Port Jackson, Australia.

Described from a single specimen.

Section CAPULACMÆA, M. Sars.

C. RADIATUS, Sars. Pl. 40, figs. 84–87.

Thin, transparent, radiately striate or smooth except growth-lines, whitish or yellowish, faintly strigate with darker color, under a thin yellowish epidermis, base rounded, apex small, inclined. Length, 22 mill.

Circumboreal: *Sea of Ochotsk, Alaska, Davis's Strait, Norway, Spitzbergen, Japan.*

The synonymns are *Pilidium commodum*, Midd. (figs. 86, 87), *Piliscus probus*, Lovén, *Capulus dilatatus* (figs. 84, 85), and *C. depressus*, A. Adams.

ALLERYA KREBSII, Mörch, and PROPILIDIUM TENUE, Jeffreys, both referred to this group, are members of the family SIPHONARIIDÆ.

Section THYCA, H. and A. Adams, 1854.

C. ASTERICOLA, Ads. and Reeve. Pl. 40, fig. 88.

High-conical, sculptured with fine close-set radiating riblets; white; margin crenulated. Alt. 6 mill.

Sooloo Sea, on the tubercle of a star-fish.

Unfigured and doubtful species of Capulus.

C. (THYCA) ELEGANS, Tapp. Canefri (unfigured). *Papuan Islands.*
C. CYTHERÆA, Lesson (unfigured). *Tahiti.*
C. PALEACEA, Menke (unfigured). *Hab. unknown.*
C. JAPONICUS, A. Adams (unfigured). *Japan.*
C. GARNOTII, Payr. = Gadinia.
C. SHREEVEI, Conrad. = Hinge process of *Pholas costata*, Linn.

Genus AMATHINA, Gray, 1842.

A. TRICOSTATA, Gmel. Pl. 40, figs. 89, 90.

White, apex posterior but not marginal, recurved, with distant radiating low striæ posteriorly and three strong anterior ridges, diverging and causing a projection of the margin.

Length, 1 inch. *East Indies, Japan.*

Patella tricarinata, Linn., to which this is referred by H. and A. Adams, is an entirely different shell.

A. NOBILIS, A. Ad. Pl. 40, fig. 91.

Shell shaped like Capulus, solid, white; apex median, acute, involute, turned to the right; strongly bicarinated, posterior margin dilated. Length, 25 mill.

Saghalien Island, Japan.

A. ANGUSTATA, Souverbie. Pl. 40, fig. 92.

Elongated, narrow, a little twisted, apex recurved, spiral; with three or four anteriorly directed strong carinations, the rest of the surface with slighter radiating carinæ. Length, 12 mill.

N. Caledonia.

A. TRIGONA, Sowb. (unfigured). *Friendly Islands.*

A. BICARINATA, Pease (unfigured). *Sandwich Islands.*

Judging from the descriptions, these two species are closely allied, perhaps identical.

Subfamily *Hipponycinæ*.

Genus HIPPONYX, Defrance, 1819.

Sowerby, in the first volume of his Thesaurus, has monographed this genus, consisting then of five species, as a bivalve mollusk in connection with Crania and Thecidium, mistaking the occasionally formed calcareous base for an attached valve.

H. ANTIQUATUS, Linn. Pl. 40, figs. 93–99.

White, apex posterior, concentrically rudely, closely laminated, more or less distinctly radiately striated; epidermis pilose.

Length, ·75 inch.

Florida, *West Indies*, *Senegal*, *Polynesia*, *California*, *Panama*, *Peru*, *Australia*.

The synonyms are *H. mitrula*, Gmel.; *H. Panamensis*, C. B. Ad.; *H. foliaceus*, Quoy (fig. 98), and *H. Chamæformis*, Rochbr. (fig. 99).

H. SERRATUS, Carpenter. Pl. 40, fig. 100.

Differs from *H. antiquatus* in the character of the base of the shell (margin of aperture), which is broad and flat, made up of very numerous close-set lamellæ, deeply serrated into large, scarcely rounded lobes; the interstices are filled with epidermis, in irregular ribband-like shreds. Length, 1 inch.

Mazatlan.

Living attached to each other or to other shells. *H. foliaceus*, Menke (not Quoy and Gaimard), is probably a synonym.

H. SUBRUFUS, Lam. Pl. 40, fig. 1.

Shell orange or orange-red, decussated by radiating and concentric close striæ. Length, ·5 inch.

West Indies, *Peru*, *Panama*.

H. cernuus, Gmel., is probably identical.

H. tuberculatus, Carp., is similarly colored, with subcentral apex, close radiating ribs and concentrically tuberculate, base thick, lamellate. Length, ·5 inch.

Mörch refers it here doubtfully. *H. trigonus*, Gmel., is said to be flatter than *subrufus*, with stronger radiating sulci, and to this Mörch doubtfully refers *H. barbatus*, var. *costellatus* of Carpenter; it is perhaps only a variety of *subrufus*.

H. BARBATUS, Sowb. Pl. 40, figs. 2, 3.

Shell depressed, apex suberect, subposterior, whitish, concentrically and radiately striated, with a pilose brownish epidermis, aperture margin smooth. Length, ·75 inch.

Mazatlan, Galapagos Is., Polynesia, Japan, Cape Good Hope.

It is *H. australis*, Menke, not Lam. *H. pilosus*, Desh. (fig. 3), appears to be the same, and has priority, but the species is generally known as *H. barbatus*.

H. GRAYANUS, Menke. Pl. 40, figs. 4, 5.

Apex subcentral, ribs fewer, coarser and more nodulous than in *H. barbatus*, with softer, shorter, fewer and more irregular hairs, base flat but very broad, rather rounded at the inner margin, crenated at the outer, with numerous lamellæ, undulated but not serrated. Length, ·75 inch.

Galapagos, Panama, Mazatlan, Sandwich Islands.

Described as *H. radiatus*, Gray, a name preoccupied by Quoy and Gaimard, and by Deshayes, the latter for a fossil species. I doubt its distinctness from *H. barbatus*.

H. CRANIOIDES, Carp. Pl. 40, figs. 6, 7.

Rounded, convexly planate, the apex subcentral, radiately striate, concentrically laminate. Length, ·85 inch.

Vancouver's Island.

H. tumens, Carp. (fig. 7), is a somewhat higher form, less worn by attrition, but having the essential characters of the above; it is reported from Sta. Barbara and S. Pedro, Cal. Neither species has very good claims to recognition as distinct.

H. RADIATUS, Quoy and Gaimard. Pl. 41, fig. 8.

Shell radiately broadly costate, apex submedian. Dimensions and habitat unknown.

This species was found on a *Pterocera chiragra*, consequently is probably Polynesian. The figure is no doubt magnified, but the dimensions are not given. It appears to me not unlike *H. australis*, Quoy.

H. AUSTRALIS, Quoy. Pl. 41, figs. 9–15.

Rather thin, with broad flat radiating ribs and narrow interstices, concentric sculpture rather faint or obsolete, apex erect, subposterior; whitish, or the interstices of the ribs sometimes orange-brown, interior usually stained with orange-brown.

Length, 22 mill.

Australia, New Guinea, N. Zealand, Mauritius, Viti Is., Japan.

H. acutus, Quoy (figs. 12, 13), *H. suturalis*, Quoy (figs. 14, 15), *H. cornucopiæ*, Hutton, *H. orientalis*, Dufo, are synonyms. It is possibly *Amalthea conica*, Schum.—a name which would have priority if its identity could be fully established; another older name which possibly belongs to this species is *Patella cassida*, Dillw.

H. IMBRICATUS, Gould. Pl. 41, figs. 16, 17.

Apex subcentral, surface rayed with forty to fifty ribs, which are trellised by concentric growth-lines, yellowish white, chestnut-color stains the interior. Length, 12 mill.

Sandwich Islands.

H. CRYSTALLINUS, Gould. Pl. 41, figs. 18, 19.

White, crystalline, apex marginal, recurved, radiately ribbed, ribs somewhat undulated by the growth-lines, aperture margin thick behind, thin anteriorly. Length, 12 mill. *Hab. unknown.*

Described as a Capulus.

H. GRANULATUS, A. Adams. Pl. 41, figs. 20, 32.

Shell Capuliform, with compressed sides and posterior, declined apex; reddish brown, with white granules disposed in radiating series, and subflexuous concentric lines, reddish brown within.

Length, 16 mill.

West Coast of Africa.

Was found attached to the spine of a Cidaris, and reproduces its granulations; probably on a larger smooth surface the species would be very different in form and ornamentation.

H. DANIELI, Crosse. Pl. 41, figs. 21, 22.

Apex posterior, sharp, carmine, rest of surface brownish, radiately striate, interior chestnut-colored, more or less varied with carmine towards the apex. Length, 22 mill.

New Caledonia.

The oblique undulating ribs of the original figures, reproduced by me, are not of specific importance, resulting from a similarly sculptured surface of attachment; they do not exist on other specimens. The species is mainly characterized by its attenuated apex, thinness and color.

H. TICAONICUS, Sowb. Pl. 41, figs. 23, 24.

Suborbicular, with the apex posterior and recurved, closely radiately striate, whitish, under a pale fulvous hairy epidermis. Length, 15 mill.

Philippines.

I doubt its distinctness from *H. subrufus*, Sowb.

H. RUGULOSUS, Dunker (unfigured). *Samoan Is.*
H. PLANATUS, Carpenter (unfigured). *Mazatlan.*
H. EFFODIENS, Carpenter (unfigured). *West Indies.*
H. MINOR, Garrett (unfigured). *Sandwich Islands.*

Genus MITRULARIA, Schum., 1817.

M. EQUESTRIS, Linn. Pl. 41, figs. 25–32; Pl. 42, figs. 33–56; Pl. 43, figs. 57–67, 70.

Nearly orbicular or irregular, rather solid, varying to papyraceous, rudely convex; whitish, or more or less stained with light yellowish; radiately closely minutely ridged, or striated, outer edge of base often closely crenulated. Basal plate concave, platter-shaped, with puckered edge. Diam. 1·25 inches.

China Sea, Philippines, Indian Ocean, Prince's Isl., W. Africa, W. Indies, W. Coast of Central America, Galapagos Is.

I have interpreted this species in accordance with general usage, the Linnean species being indeterminable. The synonomy includes: ? *M. Dillwynii*, Gray, *M. umbo*, Reeve (fig. 27), *M. Neptunii*, Dillw., var. *costata*, Mörch, *M. scutulum*, Reeve (figs. 28, 29), *M. stella*, Reeve (fig. 31), *M. cepacea*, Brod. (fig. 30), *M. varia*, Brod. (fig. 35), *M. Layardii*, Reeve (fig. 33), *M. Adamsi*, Reeve (fig. 36) = *M. depressa*, Ad. and Reeve, not Lamarck (fossil sp.), *M. alveolata*, A. Ad. (fig. 34), *M. Vanikorensis*, Quoy (fig. 38), *M. cancellata*, Ad. and Reeve (fig. 37),

M. Roissyi, Dufo, *Lithedaphus longirostris*, Owen, *M. dormitoria*, Reeve (fig. 60), *M. ossea*, Reeve (fig. 39), *M. Hipponiciformis*, Reeve (figs. 40, 41), *M. cyathella*, Reeve (fig. 42), *M. bulla*, Reeve (fig. 43), *M. stultorum*, Reeve (fig. 44), *M. Tongana*, Quoy (figs. 45, 46), *M. pileopsis*, Quoy (figs. 47, 48), *M. chlorina*, Gould (figs. 49–51), *M. radiosa*, Gould (fig. 52). These forms represent a great variety in shape and sculpture, and it is not wonderful that, with the ideas prevalent among conchologists a quarter of a century ago, they were described as distinct species. I have, for convenience, separated a series of irregularly corrugated forms as a variety, but they really connect insensibly with the type.

Var. TORTILIS, Reeve. Figs. 53–59, 61–67.

Surface irregularly corrugated and folded, the folds longitudinal, oblique or concentric, sometimes taking every direction, and so thick as to obscure the radiating striæ.

West Indies, Philippines.

This form is very usual, especially in West Indian specimens. *M. diaphana* (fig. 54), Reeve, *M. Martiniana*, Reeve (fig. 55), *M. uncinata*, Reeve (fig. 57), *M. papyracea*, A. Ad. (figs. 58, 59), *M. cornea*, Reeve (figs. 61, 62), *M. cicatricosa*, Reeve (fig. 56), *M. saccharimeta*, Reeve (fig. 63), *M. Balanoides*, Reeve (fig. 64), *M. porosa*, Reeve (figs. 65, 66), and *M. fibulata*, Reeve (fig. 67), are all synonyms.

Var. ACULEATA, Reeve. Fig. 70.

Radiately striate and scaled, or short spinose.

Honduras.

M. tubifera, Gray (unfigured), from the same locality, is doubtless a synonym.

M. CORRUGATA, Brod. Pl. 43, figs. 68, 69.

Suborbicular, apex subcentral, rugosely radiately ribbed and striated, ribs scaly towards the margin; whitish, or light yellowish brown. Diam. 40 mill.

Guacomayo, Central America.

Found by Cuming, under stones at 14 fms. A beautiful form, but perhaps not specifically distinct from *M. equestris*.

M. TECTUM-SINENSE, Lam. Pl. 43, figs. 71–74.

Whitish, radiately striated or nearly smooth, with concentric lamellæ, free at the edges. Diam. 1 inch.

Philippines.

The well-known "Chinaman's hat." *M. scabies*, Reeve (fig. 74), is a synonym, and connects with varieties of *M. equestris.*

M. RUGULOSA, Dunker (unfigured). *Swain's Isl.*
M. LACTUCACEA, Rochebrune (unfigured). *Senegambia.*

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Family *XENOPHORIDÆ*.

Shell depressed or conical, trochiform, with carinated periphery, not nacreous, soldering shells, stones, etc., to its upper surface. Operculum large, horny, subannular, with lateral dextral nucleus, muscular impression sinistral, semilunar, extending the whole length.

Animal with long, annulated muzzle, elongated, subulate tentacles, with sessile eyes at their external base; foot small, used for jumping, not walking, with the anterior portion expanded, posteriorly tapering; gill long, composed of narrow laminæ and filaments. Dentition, 2·1·1·1·2; the central tooth subtrigonal, multicuspid, laterals large, subtriangular, the margin reflected and multicuspid, the marginals very narrow and long, arcuated (Pl. 30, fig. 8).

These mollusks scramble along like the Strombs; they extend and fix the front dilated part of the foot, and draw the posterior portion up to it, jerking the shell forwards at every movement; this mode of progression is adapted to the nature of the surface on which they move, which is usually composed of the debris of dead shells. The shell resembles a Trochus, but the texture is not nacreous. The peculiarity of this tribe is the habit of agglutinating foreign bodies to the upper surface of the shell, which is carried to such an extent in some instances as to conceal the volutions and give the structure the appearance of a small pile of fragments of stones and shells. That this imitation of its surroundings is protective in its nature, there can be no doubt; but in some of the species the protection is not apparent, the agglutinating process being restricted within narrow bounds, or sometimes not developed, and when exhibited is confined to a single row of small bivalves or stones on the suture or periphery, arranged with a degree of regularity as to size, and occurrence indicating the existence of choice or artistic taste on the part of the mollusk. Of the shells attached, single valves of lamellibranchs are preferred, probably because they give more

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surface for their weight than univalves, and as the back affords the best surface for attachment, the interior of these is turned up and free, thus making the whole mass particularly uninviting to any creature disposed to essay the destruction of the structure with a view to molluscous food. The near relatives of the Xenophoridæ, the Vermetids, are as well protected by soldering their shells to the surface of large bodies, but other groups not very distant appear to have no dependence but on their shell.

Genus XENOPHORA, Fischer de Waldheim, 1807.

Shell conical, trochiform, upper surface carrying shells, stones and madrepores, irregularly arranged, so as sometimes to almost completely disguise the surface; imperforate or narrowly rimate; lower face of peripheral carina striate and granular.

Tropical Seas.

Phorus, Montfort, 1810, and *Pseudophorus*, Meek, are synonyms.

Section TUGURIUM, Fischer, 1880.

Shell umbilicated, only agglutinating in the neighborhood of the suture, margin of the last whorl prolonged, thin, blade-like, smooth below; operculum trigonal or trapezoidal.

Section ONUSTUS, H. and A. Adams, 1854.

Shell conical, depressed, widely and profoundly umbilicated, periphery spinose at intervals, suture, towards the apex only, more or less ornamented with small stones or shells agglutinated to the surface. *Tropical Seas.*

Humphrey first used the faulty generic name (being an adjective), in 1797, but the justifiable exclusion of this author's genera does not prevent its use in connection with the recognizable definition of H. and A. Adams; hence I see no absolute necessity for adopting instead Haliphæbus, Fischer, 1880.

Subgenus ENDOPTYGMA, Gabb, 1877.

Shell umbilicated, agglutinating, the basal margin having one or two internal spiral plications, which have left their imprint on the cast from which the group is described.

E. UMBILICATUM, Tuomey. *Cretaceous of Alabama.*

Genus EUTROCHUS, Whitfield, 1682.

Conical above, flat or concave beneath, broadly deeply umbilicated; aperture very oblique, periphery strongly carinated or expanded; surface ornamentation unlike above and below. Differs from the umbilicated forms of Trochidæ in not forming a columella, and from Risella in being umbilicated.

E. CONCAVA, Hall. Carboniferous, *Illinois*, *Indiana*.

Genus AUTODETUS, Lindström, 1884.

Shell small, widely conical, sinistral, attached by its truncated apex to foreign bodies, axis imperforate, suture not perceptible externally. *A. calyptratus*, Schrenck, Silurian of *Gotland*. An aberrant form placed in this family by Lindström. The apical fixation resembles that of certain Vermetidæ, but the shell may be a tubiculate Annelid. *Anticalyptræa*, Quenstedt, 1884, is a synonym.

Genus CLISOSPIRA, Billings, 1865.

This curious form from the Silurian of Canada, which I have placed, with some doubt, in Trochidæ, is with equal doubt referred here by Fischer. It is trochiform, with reticulated surface; there is some evidence that towards the apex it is spirally coiled, but the cavity occupied by the body of the animal appears to be straight and central, with an aperture expanding trumpet-like all around.

The Xenophoridæ have been monographed by Reeve, in Conchologia Iconica; by Philippi, in Kuster's Conchylien Cabinet, and more recently by Dr. Fischer, in Kiener's Coquilles vivantes. They first appeared possibly in the Silurian, more probably in the Devonian, and have not been numerous at any period of the geological history.

Genus XENOPHORA, Fischer, 1807.

X. CALCULIFERA, Reeve. Pl. 44, figs. 75, 76.

Light yellowish brown, whorls convex, obliquely subgranularly undulately striate, suture and periphery agglutinating, the periphery undulated; base widely umbilicated, closely radiately striated, the striæ continued obliquely across the peripheral blade and there becoming corrugated or granose, middle of base with revolving grooves. Diam. 2·5 inches.

China.

X. Sinensis, Phil., is believed to be identical, and should perhaps be preferred, its date being earlier.

X. SOLARIOIDES, Reeve. Pl. 44, fig. 77.

Widely umbilicated, yellowish white, obliquely rugosely striated, copiously agglutinating; base radiately arcuately costulate, spirally granularly lirate, somewhat obliquely costulate at the periphery, umbilical area infundibuliform, subangular.

Diam. 20 mill.

Philippines.

Very like *X. calculifera*, but much smaller, and distinguished by its more profuse crop of foreign bodies.

X. CORRUGATA, Reeve. Pl. 45, figs. 81, 82.

Stoutly conical, diagonally wrinkled and corrugated, suture and periphery closely agglutinating fragments of shells; base with curved radiating granose striæ, and a few revolving grooves, imperforate. Diam. 2·5 mill.

Indian Ocean, Japan.

X. CAPERATA, Phil. Pl. 44, figs. 78, 80; Pl. 45, fig. 83.

Obliquely perforate, light yellowish brown, suture and periphery agglutinating, surface obliquely striate; base lamellarly striate and concentrically lirate, some of the liræ strong, elevated, becoming smaller and denser on the peripheral margin.

Diam., 1·5 inches.

E. Africa; Pondicherry.

Smaller, thinner, with less dilated periphery than the last species; distinguished also by its basal sculpture and half-open umbilicus.

X. Australis, Souverbie. Pl. 47, figs. 94, 95.

Perforate, elevated conical, light yellowish brown, obliquely subflexuously corrugated above, profusely agglutinating; base subconvex around the umbilicus and spirally sulcate, subconcave and intricately rugate towards the margin, decussated by radiating striæ, becoming subnodulous near the umbilicus.

Diam., 1 inch.

New Caledonia.

X. cerea, Reeve. Pl. 45, fig. 84.

Perforate, yellowish white, nearly smooth, profusely agglutinating; base slightly concave, very minutely spirally and concentrically striate. Diam. 25 mill.

Philippines.

X. pallidula Reeve. Pl. 44, fig. 79.

Imperforate, yellowish white, obliquely striate, profusely agglutinating; base subplane, thinly arcuately radiately striate, very minutely crispate. Diam. 2·5 inches.

Japan.

X. crispa, König. Pl. 45, fig. 85; Pl. 46, fig. 88.

Umbilicated, rather thin, whitish or light yellowish brown, obliquely rugate, and profusely agglutinating at the suture and periphery; base concentrically closely lirate, liræ about eight in number, granular, the vicinity of the periphery obliquely subradiate and granular; columellar callosity hiding a small part of the umbilicus, which is profound, lamellarly plicate.

Diam. 34 mill.

Mediterranean Sea.

The operculum is thin, with unilateral lines; the earlier whorls of the shell are smooth. First described under the above name as an Italian tertiary fossil; as a living species, Tiberi called it *X. Mediterranea.*

X. Senegalensis, Fischer. Pl. 45, figs. 86, 87.

Umbilicated, conical, rather solid, whitish, earlier whorls smooth, subsequent ones with irregular, crispate, oblique striæ and impressed lines, agglutinating at suture and periphery; base a little concave, concentrically granosely lirate, the liræ 5 or 6 in number, the liræ of the peripheral carina oblique,

crowded, more minutely granular; umbilicus slightly impinged on by the columellar callus, striate within. Diam. 16 mill.

West Coast of Africa.

Differs from the preceding species in having fewer basal costulations, with stronger granules upon them; differs also in its subrhomboidal, thin, corneous operculum having the striæ a little angular in the middle. It is *X. caperata*, Petit (non Phil.), and *X. crispa*, Martens (non König).

X. CONCHYLIOPHORUS, Born. Pl. 46, fig. 89.

Light brown, rugosely obliquely striated, profusely agglutinating large shells, stones, etc., so as almost to conceal the upper surface, face concave, imperforate in the adult, with strong, crowded, curved growth-lines, and nearly obsolete concentric low narrow ridges. Diam. 2 inches.

West Indies.

It is *X. trochiformis*, Born, *X. agglutinans*, Lam., *X. onustus*, Reeve, *X. meandrina*, *X. vulcania*, *X. tricostata*, and *X. lævigata*, Fischer de Waldh., etc.

X. ROBUSTA, Verrill (unfigured). *La Paz, L. Calif.*
X. DIGITATA, Martens (unfigured). *West Africa.*
X. CAVELIERI, Rochebrune (unfigured). *Senegambia.*

Section TUGURIUM, Fischer, 1880.

X. EXUTA, Reeve. Pl. 46, figs. 90, 91.

Suture and periphery undulated, upper surface occasionally agglutinating at the suture near the apex, but usually free from foreign bodies, obliquely undulately striated and grooved; under surface shining, smooth, surrounded by a border of several close, rugose revolving striæ, umbilical funnel closely striated; yellowish or orange-brown, lighter colored beneath.

Diam. 2·75 inches.

China.

X. INDICA, Gmelin. Pl. 46, figs. 92, 93.

Finely obliquely striated, yellowish brown, under surface smooth, lighter colored, in fresh specimens surrounded by a brown band, but without the marginal spiral striæ of the last species, umbilical funnel striated, periphery blade-like, only

irregularly slightly undulated on its edge; agglutinating only at or near the apex. Diam. 2 inches.

Indian Ocean.

X. Wagneri, Phil., is a synonym.

X. HELVACEA, Phil. Pl. 47, fig. 96.

Differs from the preceding species in the umbilicus, which has convex sides and is not defined by an angle.

Diam. 3 inches.

Madagascar.

Its distinctness from *X. Indica* is problematical.

X. CARIBÆA, Petit. Pl. 47, figs. 97, 98.

Thin, pale yellowish brown, white beneath, occasionally agglutinating on its irregularly undulating periphery; upper surface obliquely, slightly undulatingly striate; lower surface radiately finely striate, shining, with concentric obsolete grooves, bordered by a strong revolving rounded rib, beyond which is the smooth shining peripheral blade. Diam. 2·5 inches.

Isle of Marie Galante, West Indies.

X. LAMBERTI, Souverbie. Pl. 47, figs. 99, 100.

Umbilicus partly covered, its walls convex, not defined by an angle; base subconvex, strongly spirally sulcate, the peripheral blade smooth; upper surface obliquely undulately striate, agglutinating at the suture, but not at the periphery; light yellowish brown. Diam. 2 inches.

New Caledonia.

Section ONUSTUS, H. and A. Ad., 1854.

X. SOLARIS, Linn. Pl. 49, figs. 1, 2.

Upper whorls with a few small agglutinating pebbles and shells at the suture, then fringed with regular distant hollow spines on the periphery, surface obliquely granularly striate, radiately, granularly ridged below; light yellowish brown.

Diam. 78 mill.

Malacca, Singapore.

Family *VERMETIDÆ*.

Shell tubular, septate within, attached or free; sometimes regularly spiral when young, always becoming irregular in the adult growth; aperture rounded, usually entire, sometimes fissured. Operculum corneous, annular, sometimes spiral, rarely absent.

Animal vermiform, elongated, with short snout and distant short tentacles, bearing eyes at their outer bases; foot small; a single elongated branchia, no copulatory organ; two corneous jaws; dentition (Pl. 30, fig. 9).

These aberrant mollusks were separated by Cuvier in 1830, as an order under the name of Tubulibranchiata, corresponding with Tubispira, Desh., 1830, and Protopoda, Gray, 1837. A more extensive acquaintance with the modifications of the breathing organs in mollusks has tended to diminish the importance which Cuvier attached to them.

These animals, generally attached upon shells, or coral, or living in sponges, often gregarious in large colonies, although without copulatory organs are unisexual, oviparous or viviparous. The eggs are often attached to the tube itself. The embryos (Pl. 48, fig. 6) are furnished with a spiral shell and the young are often perforating.

Like most attached shells the Vermetids are exceedingly irregular in growth, sculpture and coloring, often reproducing the surface upon which they are fixed. The species are therefore very difficult to identify satisfactorily, particularly as in many specimens the parts wherein reside the characteristic marks, the mouth, the operculum, etc., are wanting. The difficulty is enhanced by the great resemblance of some of the forms to annelids of the genus Serpula—from which they may be distinguished by the spiral nuclear shell, and interior septa of the tube. The tube of Serpula is composed of two calcareous layers, that of Vermetidæ of three. As to the lamellæ occurring within the tube, on the columellar or parietal wall, they are often wanting, perhaps

absorbed away by the animal, like the teeth of Pupa, and although they are made subgeneric and sectional characters, they may be present or missing in the same species, and are consequently of inferior taxonomic importance.

Prof. O. A. L. Mörch made a special study of the Vermetidæ, and to his papers in the Journal de Conchyliologie, and particularly in the Zool. Proceedings, London, 1860–1862, we are indebted for the only scientific arrangement of them. Unfortunately this author has endeavored to name and describe every slight variation, and has thus amassed a large collection of forms, varieties and species, subgenera and genera, the study of which is even more perplexing than that of the specimens themselves. His genera are here reduced to subgenera, his subgenera to sections. Illustrations may be found in the folio volume of Chenu, in Reeve's "Iconica" and Sowerby's "Thesaurus," but these respective monographs are only partial in their scope, the two latter being confined to Siliquaria, and leave much to be desired on the score of completeness.

Dr. Leon Vaillant (*Researches on Lamarck's species of the Tubispirata in Nouv. Arch. du Museum*, vii, 1871), thus classifies the Vermetidæ:—

A. *Operculum wanting or rudimentary.*

1. Genus SERPULORBIS, Sassi.

Operculum { none. S. G. THYACODES.
rudimentary. S. G. BIVONIA.

B. *Operculum present and perfect.*

a. *Shell smooth within.*

2. Genus SIPHONIUM, Gray.

Operculum { Concave, with margins { plain. S. G. SIPHONIUM.
spinose. S. G. STEPHOPOMA.
Formed of stacked up lamellæ. Shell { non eroding. S. G. VERMICULUS.
eroding the body to which is attached. S. G. SPIROGLYPHUS.

b. *Shell with interior plications or lamellæ.*

3. Genus VERMETUS, Adanson.

With a single columellar plication. S. G. VERMETUS.
With parietal lamellæ. S. G. PETALOCONCHUS.

Synopsis of Genera.

Genus VERMETUS, Adanson, 1757.

Animal having two pedal filaments, much longer than and situated in front and below the cephalic tentacles.

Shell tubular, free or fixed, sometimes regularly spiral when young, but becoming irregularly protracted or contorted when adult, with interior septa; aperture circular; operculum usually present, corneous, annular, circular, exteriorly concave.

Inhabits temperate and tropical seas. Fossil, secondary and tertiary.

Subgenus VERMETUS (*sensu stricto*).

Shell spirally twisted, attached, surface often decussated, columella bearing one to three longitudinal lamellæ. Operculum very small, concave, scarcely spiral.

Section VERMETUS (typical).

Laminæ on the parietal wall.

Section PETALOCONCHUS, Lea, 1843.

Shell with two internal ridges running spirally along the columella, becoming obsolete towards the apex and aperture. Mostly fossil.

V. SCULPTURATUS, Lea. Tertiary. U. S. (S. and S. Conch., t. 67, f. 76).

Section MACROPHRAGMA, Carp., 1857.

Internal laminæ towards the middle of the columella; superior lamina sharp, angulately deflexed, externally bicarinate.

Operculum small, very thin, corneous, smooth, subplanate, scarcely spiral.

Section ALETES, Carpenter, 1857.

Whorls larger than in preceding section, columella with a very

faint median thread-like line; color usually yellowish brown, the early whorls chestnut.

Operculum concave externally, with 5–6 spiral laminæ, the last abrupt; interiorly convex, shining, with irregular spiral liræ; muscular area irregular, opaque.

Subgenus Bivonia, Gray, 1842.

Shell affixed, mostly spiral, with spiral, interruptedly nodulose liræ and a median elevated line; aperture contracted, circular, columella without ridges. Operculum small, rudimentary.

When these shells are not perfect, without the aperture margin, they are difficult to distinguish from *Spiroglyphus*. *Dofania*, Mörch, 1860 (in part), is a synonym.

Subgenus Spiroglyphus, Daudin, 1800.

Animal excavating a groove on the surface of shells or stones, covering it over with shelly material, and thus forming a tubular planorbiform case. Considered by some naturalists an annulose animal allied to Serpula, but of this there is no proof. When first hatched, the shell is spiral and regular, consisting of one and a half whorls; it soon attaches itself, the channel it excavates being at first shallow, afterwards deeper; color bright purple to nearly black. The operculum is large, thick, convex exteriorly, with strong concentric laminæ, plane interiorly, concentrically lirate, with central mamilla, and narrowly elevated margin.

Stoa, Serres, 1855, is in part a synonym.

Subgenus Thylacodes, Guettard, 1774.

Shell adherent, frequently solitary, tubular, irregularly twisted, with 3–5 longitudinal nodulous liræ, aperture rounded, columella not plicate, but frequently partitioned internally perpendicularly to the axis. No operculum, or minute when present.

Dofania, Mörch, 1860 (in part), is a synonym; others are *Serpulorbis*, Sassi, 1827 (a name frequently used for the genus), *Serpulus*, Montf., 1810, and *Serpuloides*, Gray, 1850. The subgenera *Cladopoda*, Gray, 1840, *Tetranemia*, Mörch, 1859,

Hatina, Gray, 1847, and *Lementina*, Risso, 1826, are founded on differences of form in the mollusk, mostly as represented by published figures, and allowing that these are correct, their value is probably no more than specific. These characters will be referred to in the descriptions of the species.

Subgenus SIPHONIUM (Brown, 1756), Mörch, 1859.

Shell adherent, irregularly twisted, carinated, without internal armature. Operculum large, smooth, circular, concave externally, convex interiorly, the scar of attachment central, with rugose concentric striæ, and plain margin.

M. Rougemont has observed at Naples that *S. maximum* emits from its mouth a thin veil-like plaited substance, which entangles small natatory animals and is subsequently withdrawn (Bull. Soc. Neuch., xii, 94).

Stoa, Serres, 1855 (in part), is a synonym, according to the text.

Subgenus STEPHOPOMA, Mörch, 1860.

Adult shell adherent, spiral, solitary or clustered; aperture slightly inflexed above, very obsoletely effused below, without internal lamellæ. Operculum slightly concave, arctispiral, furnished with long divergent multifid setæ. Recent and fossil.

The shells are generally very small, and usually so tender as to be very rarely found fossil in a good state of preservation. Difficult to distinguish from *Vermiculus*.

Subgenus BURTINELLA, Mörch, 1861.

Young shell adherent, the adult free, thick, widely conically elevated, trochiform or planorboid, usually sinistral, rarely dextral, last whorl protracted, more or less prolonged, tubular within, angular exteriorly, aperture circular, not contracted. Fossil only, 15 species. Oolitic, Cretaceous, Tertiary; *Europe*, *India*.

B. CONCAVA, Stol. (Struc. and Syst. Conch., t. 67, f. 69, 70).

Subgenus TUBULOSTIUM, Stoliczka, 1868.

Shell planorboid to broadly conical, aperture contracted, prolonged in a tube. 4 sp. Jurassic, *Europe;* Cretaceous, *India;* Tertiary, *United States*.

Subgenus VERMICULARIA, Lam., 1799.

Shell free, in its early stage regularly coiled like a *Turritella;* subsequently uncoiled, the tube variously twisted or more or less straight and prolonged. Operculum size of the aperture. Carboniferous—living. Tropical and subtropical.

There is apparently no other distinction between the shells of *Vermicularia* and *Burtinella*, except that the latter are coiled in a broad, largely umbilicated cone; *Tubulostium* has a contracted aperture. Often called *Vermiculus*, Lister.

Genus SILIQUARIA, Brug., 1789.

Animal with rudimentary pedal tentacles; mantle slit along the branchial cavity.

Shell tubular, at first spiral, afterwards protracted and irregular; tube with a longitudinal fissure, which is sometimes simple, sometimes formed by a series of perforations; often both varieties exist in the same specimen; aperture circular, without internal septa or lamellæ. Operculum corneous, subcylindrical or conoidal, formed of a spirally rolled band, with ciliated margin; axis of the cone filled up internally by a series of spiral radiating cells (Pl. 48, figs. 9, 10). *Mediterranean Sea*, *W. Africa*, *Tropical Pacific Ocean.*

Fossil, 20 sp. Tertiary, one species from the upper cretaceous. The typical species, as well as several others, occur imbedded in sponges.

Tenagodus, Gueltard, 1774, is the same, but the genus is much better known under its later name.

Fischer proposes the following divisions, based on distinctions in the branchial slit.

Section SILIQUARIA (*sensu stricto*).

Slit continuous, open.

Section PYXIPOMA, Mörch, 1860.

Slit closed by a lamella, but not filled up outside, open near the mouth.

Section AGATHIRSES, Montfort, 1810.

Slit composed of numerous isolated holes.

As all three kinds of slit may exist in different parts of a single specimen, the above classification has but little to recommend it; and yet in a rough way the distinctions of the slit hold good.

About a dozen species have been recognized by Mörch, Sowerby and Reeve. The monographs of the Thesaurus Conchyl. and Conchologia Icon. are essentially the same; an earlier one is contained in Chenu's Illust. Conchyliologiques.

The recent species are tropical and subtropical in distribution. They live on rocks and corals; the restricted group *Siliquaria* inhabits sponges.

Genus CRYPTOBIA, Desh., 1863.

Proposed for a perforation in polyps, sometimes lined by a shelly plate, sometimes without it; spire regular, of 5 or 6 whorls, in the middle of the polyp; the following whorls are unrolled; on one of the walls is found a series of fissures, which traverse the polyp. *C. Michilini*, Desh., Isle of Bourbon. These perforations are filled by parasitic sipunculi, which may have destroyed in some cases the shell of the mollusk.

Genus VERMETUS, Adanson, 1757.

Subgenus VERMETUS (sensu stricto).

Typical.

V. ADANSONII, Daudin. Pl. 49, figs. 20, 21; Pl. 48, fig. 12.

Shell graceful of 5–12 whorls, loosely or more or less closely coiled, and terminating in a rather straight tube about an inch in length when adult, strongly striated by 6 to 12 raised longitudinal ridges or lines, sometimes chagreened; dark brown, becoming ash color in dead shells. Operculum very thin, with two small concentric grooves, about half the diameter of the aperture.

Senegal.

It is *Vermetus lumbricalis*, Roissy, not Linn.

Var. LAMARCKII, Mörch (fig. 21).

Does not appear to possess any immutable distinctive character; the tube is said to be thin towards the mouth, the attach-

ment is by the apex, the surface is sometimes transversely and not longitudinally sculptured.

Var. CARPENTERI, Mörch.

Is founded upon the presence and form of the interior lamellæ as shown in section by the figure. Carpenter described it as *Petaloconchus renisectus* (fig. 12).

V. VARIANS, d'Orb. Pl. 49, figs. 22, 23; Pl. 48, fig. 11.

Irregularly convoluted, longitudinally rugosely costate or smooth, violaceous brown.

Brazil to West Indies, W. coast of Florida.

The varieties described by Mörch need only to be named and figured here; they are scarcely of sufficient importance to justify separate headings and descriptions. They are:

Var. CARPENTERI (fig. 11), *West Indies;* var. OCCLUSA, Mörch, *West Indies;* var. MONILE, Mörch, *Honduras;* var. IRREGULARIS, d'Orb.; var. ELECTRINA, Mörch; var. BADIA, Mörch; var. CANDIDISSIMA, Mörch; var. PERLATA, Mörch; and var. COSTATA, Mörch; all from the West Indies. As to var. IRREGULARIS, Mörch quotes the text of d'Orbigny's Cuba, but writes, "I am nearly sure that the group figured is a *Spiroglyphus*, perhaps mixed with a *Vermetus*."

V. CONICUS, Dillw. Pl. 49, fig. 24.

Flexuose, spiral at base, tube rather thick, brownish white, the spiral portion irregularly wound, about 8 whorls.

West Indies.

The sculpture varies as in the preceding species, it usually consists of longitudinal striæ; the tube is much larger than in *V. varians*, and also differs in its light color. It is *V. lumbricalis*, β. of Gmelin. Mörch has vars. PERSONATA, GORDIALIS (*decussatus*, Lam. non Gmel.), PROBOSCIS, RETIFERA.

V. RENISECTUS (Carp.), Mörch. Pl. 49, figs. 25, 26.

Brownish ash-color, attached, spirally contorted, lightly longitudinally lirate, the interstices rather smooth, especially towards the aperture, incremental striæ rugose, regular, somewhat granulated in intersecting the longitudinal liræ. Interior with two

flattened laminæ; one on either side of the columella, and a distinct line on the middle of the columella.

Philippines.

This is *V. renisectus*, Carp., in part. Mörch describes vars. GORDIALIS, ASPERULA, ASPERELLA, WOODWARDII, Carp., EBENEA, PICEA, INDENTATA, MONILIFERA.

V. CONTORTUS, Carpenter. Pl. 49, fig. 27.

Laterally attached, chestnut-color, rather thin, irregularly contorted, first whorls spiral, usually in contact, the last protracted, closely longitudinally lirate, decussated by incremental lines, the intersections very obsoletely nodulose; interior without lamella, but with 3–5 spiral liræ on the columella.

Mazatlan and Gulf of California.

Mörch adds vars. REPENS, FAVOSA, CONTORTULA, INDENTATA and CORRODENS.

V. NERINOIDES, Carp. Pl. 49, figs. 28, 29; Pl. 48, fig. 13.

Closely agglomerated, irregularly spirally twisted, orange-colored, almost everywhere superficially ashy; whorls separate, yet approximating, liræ somewhat compressed, very obsoletely nodosely contracted, interstices rather wide, with close incremental striæ; internal lamella (fig. 13) large, modifying the interior as in a section of *Nerinæa*.

Australia.

V. OCTOSECTUS, Carp. Pl. 48, fig. 14.

Solitary, laterally affixed, whitish, irregularly spirally twisted, longitudinal liræ rather remote, reticulated by closer, rugose incremental lines, with distant transverse orange lines; interior laminæ prominent, lateral, the exterior part of the chamber small in the first and large in the last whorl, columellar line acute.

So. Africa? Red Sea.

"I have seen specimens with and without internal laminæ attached on the same shell. One specimen shows on the outer wall a sharp keel pointing to the slit between the laminæ, which I have never elsewhere seen so well developed. According to Carpenter, it differs from the following species in the absence of the 'remarkable' structure at the base, and in the comparatively small size of the outer chamber; the former character is probably quite accidental, and the latter is not constant in one and

the same species. The variety (below) is still more like the *V. cereus*, which perhaps will itself prove to be merely a variety when more specimens have been compared."—MÖRCH.

Var. DILATATA, Mörch. Whorls a little flattened, suture depressed, dilated, the strong tranverse rugæ approximating. This variety is from the Red Sea, to which locality the type also probably belongs.

V. CEREUS, Carp. Pl. 48, fig. 15.

Solitary, attached, orange-color, with depressed whitish sutures, the attached side with a series of nodules which, writes Mörch, are the impressions of a coral. There is no sculpture, the specimen appearing as though it had been attacked by acid. It is a large species, the penultimate whorl having a diameter of 6–7 mill., the aperture of 4·75 mill. Lateral interior lamellæ about central.

Philippines.

Mörch has Vars. GYMNOGASTRA and TENUIS.

V. CARINATUS, Quoy. Pl. 49, fig. 30.

Widely irregularly coiled, carinated, somewhat triangular, transversely striated, yellowish ash-color, aperture rounded within.

Isl. Guam.

"I have seen forms which I regard as intermediate between *V. octosectus*, Carp., and *V. cereus*, Carp., approaching to this." —MÖRCH.

V. LILACINUS, Mörch. Pl. 49, fig. 31.

Aggregated, subcylindrical, spirally twisted, purplish, whorls contiguous with dilated white suture, longitudinal liræ obsolete, remote, incremental rugæ generally remote, stronger towards the aperture, last whorl slightly protracted; parietal laminæ very short (broken?), approximating to the columella, median columellar lira somewhat acute.

Zanzibar.

Section PETALOCONCHUS, Lea, 1843.

V. SUBCANCELLATUS, Bivona. Pl. 49, fig. 32.

Solitary, or more rarely gregarious, reclining, almost entirely affixed, irregularly spiral, with the whorls in contact, brownish, surface subcancellated by longitudinal and transverse striæ, the

anterior extremity free. Operculum plain, thin. Animal dark purple.

Southern Europe.

It is *Serpula glomerata*, of Linn., 12th Edit., but not of 10th Edit., and *V. intortus*, Weink. "I have examined five or six groups without finding any internal laminæ, as Sowerby and Moore appear to have done. In a comparatively few specimens I have found a distinct medial lira on the columella."—MÖRCH. This author describes vars. OCCLUSA, SUTURALIS and SCOLOPENDRINA.

V. VERMICELLA, Lam. Pl. 49, fig. 33.

Yellowish, filiform, narrow, transversely rugose, flexuous, without longitudinal sculpture, conglomerated into a dense mass.

W. Africa.

It is *V. glomeratus*, Daudin, *V. Lispe* (Adanson), Deshayes. Mörch describes a var. FILARIS.

V. ANELLUM, Mörch. Pl. 49, fig. 34.

Shell sinistral, spirorbiform, white, spire affixed, umbilicus open, whorls few, with transverse close ribs. Diameter of shell about 2 to 3·5 mill.

Todas Santos Bay, L. California (on *Haliotis*).

Very like a *Spirorbis* in shape, and "perhaps will prove to be the type of a new genus."—MÖRCH.

Section MACROPHRAGMA, Carpenter, 1857.

V. MACROPHRAGMA, Carp. Pl. 48, fig. 16.

Shell small, chestnut-colored, laterally attached, often eroding, spirally twisted, first whorls flattened, contiguous, the last loosely contorted, with close longitudinal liræ and incremental striæ; interior armature (see figure).

San Diego, Cal., L. Cal., Mazatlan, Realejo.

"*V. contortus*, Carp., is perhaps the adult stage of this species, which again possibly may be a form of *Aletes centiquadrus*."—MÖRCH.

V. COCHLIDIUM, Carpenter. Pl. 48, fig. 17.

Distinguished from the preceding species by its internal laminæ; the shell is of a lighter color and larger growth.

Australia; var. from *Tahiti.*

V. FLAVESCENS, Carp. Pl. 48, fig. 18.

"Shell externally closely allied to *V. subcancellatus*, from which it is principally known by the smaller size and stronger sculpture. Internally it most resembles *V. cochlidium*, from which it may be distinguished by the absence of keels on the upper lamina through a large part of the length; and by the general absence of the third plait, which, when it appears, is like another fold of the lower lamina in the same direction." —MÖRCH.

Sicily.

Section ALETES, Carpenter, 1857.

"The operculum seems to me only different from that of *Vermetus* in size, in consequence of the larger calibre of the shell. The variety of *Vermetus conicus*, Dillw., would be referable to this group, if I had not seen one and the same specimen successively in the different whorls change from *Vermetus* (*Petaloconchus*) to *Thylacodes*, and ultimately to *Aletes*."—MÖRCH. Yet Mörch himself admits these subdivisions and the distinction of species by small differences in the internal shell.

V. CENTIQUADRUS, Valenc. Pl. 49, fig. 35; Pl. 50, figs. 36–40.

Laterally attached, spirally twisted, earlier whorls rather narrow, rapidly increasing, the last wide, spread out and compressed at the margin; light yellowish brown, with obscure narrow lines, earlier whorls dark brown, the interstices of the liræ impressed punctate.

Panama to Gulf of California.

"The first whorls are of a dark brown color and strongly sculptured with longitudinal liræ and transverse rugæ exceedingly like *V. contortus*, Carp., which I suppose to be only a form of this shell, judging from analogy with *V. conicus*, Dillw. The columella shows one exceedingly feeble median lira, scarcely to be seen except in a very favorable light, and two very conspicuous lateral liræ which seem to answer to the laminæ in *V. macrophragma*, but they must perhaps be more properly regarded as the margins of a thin layer covering all the interior of the whorls, except the larger median part of the columella, which shows a slight difference in color." Animal violaceous,

deepest on the back, more bluish and lighter towards the margins of the foot.—Mörch.

It is *V. effusus*, Val. (fig. 36), *V. angulatus*, Rouss. (fig. 37).

Var. Panamensis, Rouss. (fig. 35). = Var. *maxima*, Mörch. Differs in its smooth surface and deep transverse furrows.

Var. Peronii, Val. (fig. 38). Without impressed punctations.

Var. siphonata, Mörch (fig. 39). = *V. Peronii*, Rouss., non Val. Subcylindrical, spirally twisted, vertically attached, suture dilated, with close, very obsolete nodulous liræ, the interstices impressed punctate. Diam. apert. 5·5 mill. *Puntarenas.*

Var. tulipa, Rouss. (fig. 40). Laterally attached, irregularly spirally twisted; whorls oblique, smooth or very obsoletely sculptured on the later whorls, variegated violaceous and white.

Var. Bridgesii, Mörch (unfigured). Very like the last, but the color is mostly obliterated and the last whorl is partly free and erect.

V. Roussæi, Vaillant. Pl. 51, fig. 43.

Earlier whorls spirally twisted, afterwards lengthened, undulated, longitudinally lirate, liræ fading towards the aperture, cancellate towards the base, which is flattened.

Timor.

The figures of Chenu's Illust. Conch. represent two species. One of these is selected by Mörch as best answering the original description of *V. sipho*, Lam., and I have copied it; the other appears to be a *V. polyphragma*, Sassi. Vaillant, from an examination of specimens in the Paris Museum, thinks that neither of these figures represents the type, and he therefore describes the *sipho* of Rousseau and Mörch, as *V. Roussæi*, Vaillant. I may add that none of the figures cited by Lamarck himself agree with his description.

Unfigured Species of Vermetus.

V. balani-tintinnabuli, Mörch, and Var. crystallina, Mörch. *Philippines.*

V. pachylasma, Mörch. (Possibly a fossil.) *? Guinea.*

Subgenus Bivonia, Gray, 1842.

V. triquetra, Bivona. Pl. 50, figs. 41, 42.

Solitary or gregarious, subtriangular, a little depressed, orbicularly or turbinately twisted, transversely flexuosely rugose, anterior portion of the shell when free, becoming cylindrical, but if remaining attached, continuing subtriangular; whitish or brownish.

Mediterranean Sea.

V. contortuplicatus, Var., A. Scacchi, is a synonym.

Var. pinnicola, Mörch. Irregularly spiral, with three crenulated longitudinal lines. It is *V. granulatus*, Graven., not Fabr., and perhaps *V. rupestris*, Risso.

Var. spirorbis, Mörch. Solitary, white, cretaceous, spirorbiform, with a crenulated dorsal carina, and one or two arcuate varices in the penultimate whorl.

Var. aletes, Mörch. Laterally affixed, whorls flattened, obliquely declined; dorsal carina compressed, crenulated, approximating the umbilicus; incremental striæ membranaceous, obsoletely undulated in the umbilical region.

Vars. serpulina, expansa and ampliata, Mörch.

Var. fascicularis, Mörch (fig. 42). Shells aggregating, base spiral, anteriorly upright, rounded. Forms a transition to the next species, from which perhaps it does not differ.

V. semisurrectus, Bivona. Pl. 51, fig. 44.

Solitary, cylindrical, white, apex contorted, rugose, adnate, anteriorly the tube is free, flexuose, longitudinally striate or almost smooth. *Mediterranean Sea.*

V. Sequensianus, Avadas and Benoit. Pl. 51, fig. 45.

Irregularly spirally twisted and attached below, finally becoming erect; whorls at first angulated, rugosely longitudinally striate, and with stong incremental striæ, the free portion becoming cylindrical and smooth, rather fragile, gregarious.

Sicily.

V. Quoyi, H. and A. Adams. Pl. 51, fig. 46.

Solitary, loosely contorted, rather thin, livid white, brown clouded, attached at the end, last whorl long, flexuous, with

obsolete longitudinal liræ, and still more obsolete intermediate striæ, incremental striæ membranaceous; aperture circular, diam. about 4 mill. *Philippines.*

Shell very like the preceding.

Mörch adds vars. LILACINA, PLANORBOIDES, LAQUEARIS, RUGOSO-SQUAMOSA, STRIGATA, PAPILLOSA, CORALLIOPHILA, TRIQUETRA, GRANIFERA, FULGURATA, PUNCTATA, VARIEGATA, FLOS-LACTIS. According to Vaillant Lamarck's *V. eruca*, from examination of the specimen, is the same and should have priority.

V. GOREENSIS, Gmelin. Pl. 51, fig. 47.

Conglomerated, rounded, cancellated, yellowish, corneous within, with close longitudinal elevated striæ. L. of tube 8–9 inches, diam. 6–8 mill. Operculum so small as to be hardly perceptible, not over a quarter of a millimetre in diameter.

W. Africa.

Unfigured Species.

V. EXSERTA, Dall. *West Indies.*
V. CONSTRICTOR, Mörch. *Australia.*
V. SUTILIS, and vars. MAJOR and TRIQUETRA, Mörch. *Panama to Mazatlan.*
V. IONICA, Danillo and Sandri. *Dalmatia.*
V. GREGARIA, Monts. *Sicily.*
V. PANORMITANUS, Gregorio. *Sicily.*
V. COMPACTA, Carp. *Vancouver's Island.*

Subgenus SPIROGLYPHUS, Daudin, 1800.

V. SPIRULIFORMIS, De Serres. Pl. 51, figs. 48, 49.

Spiruliform, brownish or ash colored, or white, sometimes fasciated, the last whorl detached but continuing spiral, smooth or with growth-striæ. Diam. 1 inch.

Zanzibar, Philippines, Red Sea.

Mörch describes vars. SCAPHITOIDES, VORTEX, LEMNISCATA, SPIRALIS, SOLIDISSIMA, IMMERSA (fig. 49), ERYTHRÆENSIS, DISCULUS.

V. AMMONITIFORMIS, De Serres. Pl. 52, fig. 54.

Planorbiform, last whorl closely wound like the others, with strong incremental striæ. Diam. 20 mill.

Indian Ocean, on *Perna isognomon.*

V. SPIRORBIS, Sowb. Pl. 51, fig. 50.

Planorbiform, white, smoothish, whorls not in contact.

? Cape of Good Hope.

V. ANNULATUS, Daudin. Pl. 51, figs. 51, 52.

Irregularly spiral, transversely lamellate.

West Indies, on Shells.

Var. CORRODENS, d'Orb. (fig. 51). Having a peripheral carination, forming a tooth-like projection at the mouth. This is var. *dentifera* of Mörch.

Var. IRREGULARIS, d'Orb. (fig. 52). Brownish black, irregularly contorted, transversely rugosely plicate. This is var. *glomerata*, Mörch.

Var. TROCHICOLA, Mörch (unfigured).

V. GLOMERATUS, Bivona. Pl. 51, fig. 53; Pl. 52, figs. 55–58.

Conglomerated, tubes cylindrical or subangulated, contorted, transversely undulately rugose. *Mediterranean Sea.*

Mörch has vars. CRUSTANS and TUBULOSA = ANNULATA, Lam. (fig. 58).

V. cristatus, Biondi, is the young of this species. Vaillant remarks that Daudin's species is smaller than *V. annulatus*, Lam., and corrodes the surface upon which it is attached; as Daudin has priority he proposes for the Lamarckian species *V. annularium.*

Monterosato has substituted the name *petræa*, because of *Serpula glomerata*, Linn.; he adds a var. *minor.*

Embryonal whorls smooth, projecting in the centre of the shell, and not unlike a very small Amnicola. Has more regular whorls and wants the tooth-like process of the carina in the aperture of *V. annulatus.*

Doubtful and Unfigured Species.

SERPULA COSTALIS and S. INFUNDIBULUM, of Chenu's Illust. Conch.

V. ALBIDUS, Carp. *Mazatlan.*

V. STRAMONITÆ. Mörch. *? Guinea.*

V. ANGULIFERA, Monts. *Tripoli.*

V. PLANORBIS, Dkr. Pl. 52, fig. 59.

Planorbiform, somewhat solid, white, carinated, transversely sublamellate, whorls in contact.

Japan, slightly immersed in the surface of *Vermetus imbricatus*, Dkr.

UNIVERSITY CALIFO

Subgenus THYLACODES, Guettard, 1774.

V. POLYPHRAGMA, Sassi. Pl. 52, figs. 60–62.

Solitary, irregularly twisted, commencing irregularly spiral, with dilated suture, afterwards rounded, longitudinally finely striate, the striæ often alternately smaller, frequently granose, sometimes with three or four strong liræ, remote nodules and intervening brownish punctations; color usually whitish or yellowish white. Aperture, 14 mill. wide.

Mediterranean Sea.

The synonyms are *V. arenaria*, Lam., in part., *Serpula intestina*, Salis, *Dentalium intestiniforme*, Linn., teste Hanley, *V. gigas*, Gray, in part.

Var. ALETES, Mörch (fig. 62). Laterally attached, almost regularly spiral; last whorl somewhat protracted. It is *V. lineolata*, Gravenh.

Var. AMPLA, Mörch. Loosely contorted, rather thin, whorls scarcely contiguous, the last rather short, solute, with approximating small longitudinal liræ decussated by incremented striæ, interstices lightly punctate; last whorl with two or three interrupted liræ above, elongately nodulose; whitish, or yellowish white, first whorls light violaceous.

Malta.

V. DENTIFERUS, Lam. Pl. 52, fig. 63.

Large, subsolitary or often conglomerated, irregularly twisted at first, with rugose growth-striæ, fine longitudinal lines, and frequently two or three longitudinal riblets bearing distant tubercles.

Indian Ocean, Australia.

Mörch describes a var. REPENS. The following species is probably only a variety, and both might be referred to *V. polyphragma*. The Lamarckian examples appear to include several species, according to M. Vaillant; I give the form as restricted by Mörch.

V. NOVÆ-HOLLANDIÆ, Rouss. Pl. 53, fig. 64.

Shells agglomerated, inferiorly contorted, then protracted,

with numerous subdentate longitudinal costellæ, and intervening striæ; brownish. Probably identical with the foregoing species.
Australia.

Described by Mörch under the name of *V. sulcatus*, Lam., but one of the three types of that species is a fossil and different, the other two appear to be *V. sipho*, Lam.

V. MASIER, Deshayes. Pl. 53, fig. 65.

Large and thick, irregularly spiral, not elevated, with about twenty longitudinal grooves; grayish, yellowish brown or flesh-color, corneous within. Length, 1 foot, diam. 16–18 mill.
Cape Verde Is.

Le Masier, of Adanson. It is also *V. sipho* (Lam. in part), Blainv., and *V. arenarius*, Daudin.

V. BRAZILIENSIS, Rousseau. Pl. 53, fig. 66.

Large, solitary, at first spiral, last whorl protected, lightly curved, erect, with slight distant spiral liræ.
Diam. apert. 30 mill. *Brazil.*

V. ATRA, Rousseau. Pl. 53, fig. 67.

Usually solitary, thick, spirally twisted, laterally attached, last whorl protracted, rounded, the affixed ones with expanded sides; surface with close growth-lines, and distant longitudinal lirulæ; black or very dark brown. Diam. of aperture, about 20 mill.
Philippines, New Caledonia, East Indies.

This is *Serpula colubrina*, Bolten, *V. fuscata*, Humphr., ? *V. ochrea*, Gmel. Mörch adds vars. ALBINA, brown and blackish, mixed with white towards the aperture, VIOLACEO-FUSCA, LÆVIUSCULA, and AGGLOMERATA.

V. IMBRICATUS, Dunker. Pl. 53, fig. 68.

Rather solid, laterally attached, anteriorly sometimes free and erect, light brownish, with longitudinal, subimbricated costulæ.
Japan.

V. NODOSO-RUGOSUS, Lischke. Pl. 53, figs. 69, 70.

Whitish, yellowish or violaceous brown, somewhat solid, irregularly twisted, anteriorly shortly erect, flat and attached below, obsoletely carinate and nodosely transversely wrinkled above, becoming smoother towards the aperture. *Japan.*

V. DECUSSATUS, Gmelin. Pl. 53, figs. 71, 72.

Rather solid, variously twisted, solitary, laterally attached; whorls rounded, sometimes contiguous at the commencement, with longitudinal liræ and intermediate striæ, decussated by incremental striæ; yellowish white, variegated and clouded by light brown.

West Indies.

Mörch describes vars. TENUIS, INTERMEDIA, LÆVIGATA, with smooth whorls, represented in part by V. PORITES, Rouss. (fig. 72), all from West Indies; and vars. PHILIPPINENSIS and BADIA, from the Philippine Islands.

V. SQUAMIGERUS, Carp. Pl: 54, figs. 73, 74.

Yellowish white, usually conglomerated, loosely twisted, becoming erect, closely longitudinally costate, with intermediate raised lines, scaly decussated, the erect anterior portion marked by rugose incremental striæ only.

Southern California, Lower California.

Var. PENNATA, Mörch (fig. 74).

Solitary, laterally attached, longitudinal liræ rather distant, compressed, nodosely serrated, alternately smaller, the interstices striate; whitish, or yellowish, with angulated (pennate) incremental striæ, which are occasionally chestnut-colored.

California.

This is *V. margaritarum*, of Val. (Voy. Venus), in part.

V. MICHAUDII, Rouss. Pl. 54, fig. 75.

Yellowish white, laterally attached, longitudinally closely striate, with distant annular ribs.

Hab. unknown.

V. PORITES Rousseau. Pl. 54, fig. 76.

Thin, laterally attached, very lightly longitudinally striated; incremental striæ very close, obsolete, with regular, remote incremental sulci, the interstices slightly convex; yellowish white, darker within.

Hab. unknown, on a coral.

V. LONGIFILIS, Mörch. Pl. 54, fig. 77.

Reclining, laterally attached, loosely twisted, variegated with yellow and light brown, longitudinally lirulate, with three or

four stronger, remote liræ, aperture transversely oval, bluish within. *Australia.*

This is the type and only species of the subgenus *Tetranemia*, Mörch, which is described as having very long pedal filaments, subulate, and not retractile, with an intermediate mamilla; the mesopodium small, elongated, with two posterior short filaments.

V. dentiferus, Quoy, not Lamarck, is a synonym.

V. INOPERTUS, Rüppell. Pl. 54, fig. 78.

Olivaceous, rather thick, twisted. Animal with conical rostrum; tentacles short, thick, proceeding from a heart-shaped dorsal process; no pedal filaments, metapodium large, cylindrical, truncate, penis subulate. *Red Sea.*

It is *V. operculatus*, Gray, and (according to Issel) *V. eruca*, Lam.

V. GRANDIS, Gray. Pl. 54, fig. 79.

Clouded, yellowish brown, contorted, laterally affixed, longitudinally striate, flattened on the base, convex above, where there are two or three more prominent rugose ridge-like striæ, aperture round, violaceous.

Australia.

This is the type of the subgenus *Cladopoda*, Gray, and the following species are included therein by Mörch. The diagnosis is: Operculum none; foot elongate, front end simple, hinder extremity oblong, clavate or subtruncate.

It is *V. arenarius*, Lam., of Quoy and Gaimard. Mörch adds a Var. OXYGONA.

V. ELEGANS, Quoy and Gaimard. Pl. 54, fig. 80.

Animal cinereous, the tentacles, head and foot maculated and spotted with red. Shell and habitat unknown.

V. ZELANDICUS, Gray. Pl. 54, fig. 81.

Animal with yellowish head, brown and red-spotted in front, foot yellowish, spotted with red, mantle widely margined with orange-red. Shell contorted, having no characters of importance. *New Zealand.*

Possibly identical with the preceding species. It is *V. Novæ-Zelandiæ* of Gray.

Doubtful and Unfigured Species of Thylacodes.

V. Cuvieri, Risso (Pl. 48, fig. 19). *Southern Europe.*

This unrecognized species is the type of the subgenus Lementina, Risso, distinguished by the remarkably radiated metapodium. Dr. Gray regarded it as "probably only a badly described and figured *Serpuloides arenarius*."

V. oryzata, and var. annulatus, Mörch. *Panama.*

V. Rumphii, Blainv. (V. protensa, Dillw., V. vermium, Petiv.). *Hab. unknown.*

V. protensus, Gmel. *Hab. unknown.*

V. scaber, Gravenhorst. *Hab. unknown.*

V. Natalensis, Mörch. *So. Africa.*

V. eruciformis, and vars. erythrosclera and lumbricella, Mörch. *California.*

V. Riisei, and vars. Muhlenpfordei, and limacella, Mörch. *West Indies.*

V. Turonius, Rouss. Definitely ascertained to be a fossil. See Vaillant, *Nouv. Arch. du Mus.*, 193, 1871.

V. annulus, Rouss. *Hab. unknown.*

V. selectus, Monts. and vars. arborea and ramosa. *Mediterranean Sea.*

V. melanostomus, Mörch. *Zanzibar.*

V. sipho, Lam. *Timor.*

V. Lamarckii, Vaillant. *Australia.*

Subgenus Siphonium (Browne, 1756), Mörch, 1859.

V. lituella, Mörch. Pl. 54, fig. 82.

Variously twisted, often openly spiral, laterally attached and deeply immersed, with a median carina or rib above, which is more or less nodulous, and close, rugose incremental lines; color whitish or ash, often obsoletely brown clouded, early whorls chestnut colored. *California*, on *Haliotis*, etc.

It is *V. ammoniformis*, Serres.

V. afrum, Gmel. Pl. 54, fig. 83.

Very solid, white, corroding and attached laterally, spiral, becoming thinner towards the aperture, with a superior rib and obsolete longitudinal striæ, distant incremental sulci, and close arcuate incremental striæ. *Gaboon, W. Africa*, on *Chama*.

It is "Le Datin" of Adanson.

V. POLITUS, Daudin. Pl. 54, figs. 84–86.

Paucispiral, openly wound, like a hunting-horn; whorls two, rapidly enlarging to the rounded aperture, laterally attached and corroding, white, smooth, with somewhat distant annular constrictions.

Indian Ocean, etc. On *Tridacna* and *Serpula*.

V. perforans, Serres, is a synonym.

V. NEBULOSUS, Dillw. Pl. 54, figs. 87, 88.

Young shell planorbiform, corroding, chestnut-color to white, slightly spirally lirulate; afterwards contorted, variegated with light brown and white, liræ rugose, with three squamiferous liræ above; finally becoming free, with rugose annulations and sulcations, and longitudinal sculpture obsolete.

West Indies.

Mörch describes Vars. SERRATA, ACULEATA, TURBOIDES = *Serpula bicarinata*, Sowb. (fig. 88), IMBRICATA = *Serpula dentifera*, Sowb., PLANORBOIDES, RUGOSA, ANAULAX, FISSURATA.

V. MARGARITARUM, Val. (in part). Pl. 55, fig. 92.

Large, spirally lirulate, with more distant nodose ribs, chestnut-brown to yellowish.

Panama—Mazatlan.

V. MAXIMUS, Sowb. Pl. 55, figs. 89, 90.

Large, irregularly twisted, rather smooth, annularly rugose, dorsal carina becoming spinose anteriorly; often deeply imbedded in coral; diam. of aperture 1 inch. The young shell is subtriangular, with dorsal carina.

Java—Polynesia.

Mörch describes several varieties; among them he names SCANDENS, MEGACENTRO, PRÆLONGA, BIANGULARIS.

Undetermined and Unfigured Species.

V. CARINIFERUS, Gray. *New Zealand.*

V. LAMELLOSUS, Hutton. *New Zealand.*

V. SUBGRANOSUS, Mörch, with Vars. CARINATA, COSTALE, and TRIQUETRA. *East Indies.*

V. LURIDUS, Mörch. *Society Islands.*

V. GÆDAROPI, Mörch (*V. turboides*, Chieregh.).
? Spain on *Spondylus.*

V. PICTUS, Mörch, and Var. TURBOIDES. *East Indies.*

V. TEXTUM, Mörch, and Vars. SCAPTOIDES and UNGUICULATA.
Philippines.

V. SUBCRENATUS, Lam. *East Indies, Philippines.*

Vars. SQUAMULOSA, BIFUNICULARIS, CRISTATA, SUBDECUSSATA, and SPINOSA, Mörch.

V. DACOSTÆ, Mörch (Pl. 55, fig. 91). *Hab. unknown.*

V. PLATYPUS, Mörch. *Sandwich Is.*

V. TEREDULA, Mörch. *? Morocco.*

V. LEUCOZONIAS, Mörch. *W. Africa.*

V. MEGAMASTUM, Mörch (Pl. 55, fig. 93), and Var. IMBRICATUS, Carp. *California.*

? V. ADAMSII, Mörch. *? Borneo, Japan.*

V. PLICARIA, Lam. *Australia.*

Subgenus STEPHOPOMA, Mörch, 1860.

V. ROSEUS, Quoy and Gaimard. Pl. 55, fig. 94.

Shell small, spirally twisted, cylindrical, rugose, rose-colored. Operculum round, brownish, multispira bearing a large number of divergent multifid corneous hairs.
New Zealand.

V. PENNATUS, Mörch. Pl. 55, figs. 95, 96.

Solitary, spirally angulately twisted, with open umbilicus; whorls obsoletely quadrangular or pentagonal, closely longitudinally lirulate, incremental striæ irregular; white, brownish or variegated.
W. Coast of Central America.

Mörch describes a var. *bispinosa*, distinguished by a different form in the bristles of the operculum, when viewed under a lens.

Unfigured Species.

V. SENTICOSUS, Mörch. *Hab. unknown.*

V. TRICUSPIS, Mörch. *Australis.*

V. LYNGBYANUS, Mörch. *Denmark.*

Subgenus VERMICULARIA, Lam., 1799.

The animal is thus described by Stimpson:

"Mantle fringed at its margin with short filaments; foot very short and broad, dilated into rounded auricles anteriorly; muzzle broad, not cleft; tentacula short, conical, with eyes at their exterior base; an elevated ridge runs along the back, becomes flattened into a membrane at the head, and passes round under the right tentacle, forming a kind of canal, near which is the anus; its color is light brown, with patches and spots of black. Viviparous. The young shell is helicoid and reversed. Operculum corneous, black and hard on the inner, and lamellated on the outer surface; it is surrounded by a thin, membranous, flexible portion, about one-fourth its diameter; thus it is enabled to close its shell perfectly at the aperture, and yet to retreat far into the narrower whorls."

V. TORTUOSUS, Solander. Pl. 55, fig. 97; Pl. 56, fig. 1.

Loosely twisted, whorls flattened or slightly concave on the exterior, smooth, rectangular above and below, margined by a rib, spire short, conical.

Philippines.

V. costalis, Rouss., is a synonym. It is doubtful whether this species is distinct from *V. lumbricalis;* yet Mörch has described vars. *unicostalis* (fig. 97) and *nidificans.*

V. LUMBRICALIS, Linn. Pl. 55, fig. 98.

Yellowish chestnut color; whorls rounded with or without one or two exterior carinæ, sometimes with two slight inferior carinæ, smooth or longitudinally striæ.

Philippines, East Indies.

This is the well-known type of the family Vermetidæ. It is very doubtful whether it should be restricted to oriental specimens, as no permanent differential characters appear to characterize the forms from other localities which have received distinct names, as for instance, that of the Atlantic coast of the United States and West Indies. Mörch has described vars. DIAPHANA, CORNEA, AMPLIATA, RUGULOSA and TERES (= *Indicus*, Rouss. in part).

V. SPIRATUS, Phil. Pl. 55, figs. 99, 100.

Shell chestnut-colored, varying to light yellowish ash, more or less longitudinally striated and carinated.

Atlantic Coast of the United States, West Indies, Gulf of Mexico.

Var. MELANOSCLERA, Mörch. Shell solid, chestnut-colored, with dark transverse striæ, obtusely quadrangular, exteriorly angulated in the middle, the angle lighter colored, longitudinally lirulate, interior sides strongly lirate.

Vera Cruz.

Var. QUADRANGULARIS, Mörch (= *quadrangulus*, Phil.). Reddish brown.

Yucatan.

Var. BICARINATUS, Mörch. This is the ordinary West Indian and Florida type as figured above. Dall. describes a *V. lumbricalis*, var. *nigricans*, growing in large patches, almost forming reefs on the West Coast of Florida. He can scarcely refer to this form; more probably it is *V. varians*, d'Orb. This is *V. lumbricalis*, d'Orb., *V. Knorri*, Desh.

Var. RADICULA, Stimpson (fig. 100). Yellowish ash-color, with several unequal strong ridges, sometimes spotted with chestnut, and intermediate fine lirulæ. *United States, Mass. to Fla.*

This is *V. lumbricalis* of Gould, and var. *cinerea* of Mörch.

Vars. UNGULINA, SCALARIS and TERES are also given by Mörch.

V. DIMORPHUS, Mörch. Pl. 56, fig. 2.

Solid, spirally twisted, variegated ash-color and cinnamon; whorls loose, laterally connate and affixed, longitudinally closely striulate, with three unequal remote exterior liræ, upper side with a plane surface destitute of sculpture.

Philippines.

Mörch adds a var. LITUINA.

V. PELLUCIDUS, Brod. and Sowb. Pl. 56, figs. 3–6, 9, 10.

Pellucid, longitudinally striate, carinate towards the apex.

West Coast of Central and South America.

Var. PLANOBOIDES, Mörch, fig. 9. Rather thin, irregularly planorbiform, laterally affixed, beautifully densely longitudinally striated and flatly lirate, spire turretelloid. It is *Serpula regularis*, Chenu.

Var. CRASSA, Mörch, fig. 10. Liræ prominent, shell irregularly twisted. Animal greenish maculated and reticulated with white, tentacles long, subulate, interruptedly lineated; proboscis short, rounded. This is *Serpula Panamensis*, Chenu.

Var. EBURNEUS, Reeve (fig. 6). Shell white, thick, loosely whorled, with distant, subobsolete longitudinal sculpture. = Var. *volubilis*, Mörch.

There are also vars. LAQUEARIS, CINNAMOMINA, PICTA, TIGRINA, CASTANEA, DISCIFER and SUBGRANOSA of Mörch.

V. EFFUSUS, Val. in part (Pl. 56, fig. 7). *Hab. unknown.*
V. TURRITELLA, Rouss. (Pl. 56, fig. 8). *Hab. unknown.*
V. SOLARINUS, Mörch (unfigured). *Philippines.*
V. RASTRUM, Mörch (unfigured). *Hab. unknown.*

Genus SILIQUARIA, Brug., 1789.

Section SILIQUARIA (*sensu stricto*).

S. PONDEROSA, Mörch. Pl. 57, fig. 11.

Yellowish white, very thick, large; whorls broadly convoluted, apex obtuse, outer half of whorls much thickened by a deeply transversely fissured layer, slit continuous below, margined above by waved dentate lamellæ, in the earlier whorls usually articulated, thin, filled within by shelly matter.

Australia.

S. SENEGALENSIS, Recluz. Pl. 57, fig. 12.

Heavy, upper portion of spire-whorls a little convex, plane or excavated, closely radiately undulate-sulcate, closely volute, forming a narrow umbilicus, externally transversely deeply fissured, slit open, slightly undulate-dentate; pink or pale fulvous.

Senegal.

This is *S. incisa* of Mörch, not Chemnitz.

Var. ROSEA, Mörch. Deep rose-color, apex whitish, umbilicus pervious.

Var. LINEATA, Mörch. Whitish, whorls with close longitudinal light orange-colored lines below.

S. ENCAUSTICA, Mörch. Pl. 57, fig. 13.

Small, thick, rugose, irregularly pyramidal, pointed, tube small, umbilical region covered by an enameled callus, thickened, roughly wrinkled and transversely fissured on the peripheral side; slit closed in the upper whorls, then articulated, finally open, continuous.

Ceylon.

Described from a single specimen in the Cumingian collection.

S. TROCHLEARIS, Mörch. Pl. 57, fig. 14.

Rather thin, umbilicus narrow, pervious; whorls 6, at first close, then dissolute, plane above and below, transversely densely rugosely fissured, longitudinally very obsoletely striate and sulcate, with yellowish spiral lines, slit undulately dentate.

Philippines.

S. OBTUSA, Schum. Pl. 57, figs. 15, 16.

Shell elongated, whorls large, spirally rather finely lirated, smoother on the umbilical face, thickened on the outside and transversely fissured; spiral slit simple, frequently closed towards the apex.

Mediterranean Sea.

It is *S. anguina*, of Phil., Sowb., etc., but not of Linnæus. There are Vars. ROSEA, Montr., and COSTÆ, Cantraine.

Section AGATHIRSES, Montfort, 1810.

S. AUSTRALIS, Quoy and Gaimard. Pl. 58, fig. 20; Pl. 57, fig. 17.

Shell large, thick, apex pyramidal, tube finely longitudinally striated on the inner side, thick, rugose and transversely fissured on the outer side, slit represented by round holes, gaping open near the aperture.

Australia.

Mörch describes Vars. SCALARIFORMIS, MULTILIRATA and TÆNIATA (fig. 17).

S. REENTZII, Mörch.

Graceful, obsoletely longitudinally lirulate, rust color, whitish towards the aperture, with a chestnut line below the slit. First described as Var. *ferruginea* of *S. Australis.*

S. TOSTUS, Mörch. Pl. 57, fig. 18.

Small, rust color, darker brown at the apex; tube narrow, rather smooth, spire suborbicular; fissure articulated, bordered by a dentate line on either side.

Ceylon.

Differs (insufficiently) from the next species in the elliptical, distant pores, the slit being bordered by a narrow elevated undulated line on both sides; so that except in the last whorl, the slit seems situated on the top of a feeble carina.

S. CUMINGII, Mörch. Pl. 57, fig. 19; Pl. 58, fig. 21.

Whorls 5, the first scalariform, angulated behind, the angle evanescent in the last whorl, granularly lirate below, liræ distant, the interstices with intervening lirulæ, externally transversely lightly fissured, the fissures evanescent in last whorl, umbilical region longitudinally undulately striate, decussated by sigmoid, distant radiating sulci; slit at first closed, afterwards with open round holes, which finally coalesce into a denticulated open slit.

Philippines, Japan.

Mörch describes Vars. RUDIS, CONIFER, PLATYOMPHALA, LUMBRICALIS, LÆVILIRATA, JAPONICA.

S. BERNARDII, Mörch. Pl. 58, fig. 22.

White, clouded with fawn color, thin, elongated, narrowly and loosely twisted, irregularly pyramidal towards the apex; tube narrow, crenulately striated, slit band roundly articulated.

Australia.

S. ANGUINA, Linn. Pl. 58, figs. 23–25.

Shell rather thick, broadly irregularly twisted, distantly spirally ridged, ridges sharply squamose or spined; tube generally very slowly increasing; spiral fissure very narrow, partly consisting of oblong perforations, partly continuous and dentate by the coalescence of these; white, yellowish or purplish, sometimes two colors on the same specimen.

Moluccas, Ceylon.

The synonyms are *S. muricata*, Born., *S. volvox*, Dillw., *S. ruber*, Schum., *S. sulcata*, Gray, *S. polygona*, Blainv., *S. Dunkeri*, Mörch, *S. squamata*, Blainv. (fig. 25). In the latter form the slit is simple and open, although otherwise the features are those of *anguina*. This is not an error in the representation of the

shell, for similar specimens are before me, besides intermediates. These sections of Siliquaria, I repeat, are founded on evanescent characters, and should be accepted with reserve.

UNIVERSITY CALIFORNIA

Section PYXIPOMA, Mörch, 1860.

S. LACTEA, Lam. Pl. 58, fig. 26.

Narrow, smoothish, pellucid, white, obsoletely brown-tinted, rarely striated, apical whorls slightly pyramidal, fissure articulated, partly closed by an internal lamina near the apex.

Australia, China, East Indies.

Gregarious, forming conglomerated masses.

T. TAHEITENSIS, Mörch. Pl. 58, fig. 27.

Rather thick, smooth, fulvous, longitudinally lirulate, cancellated between the ridges, slit narrow, right margin thichkened.

Tahiti.

Shell much larger than the preceding, with stronger liræ, the interstices cancellated, slit coarctate. The only figure of the species is from a fragment in the British Museum.

S. WELDII, Tenison-Woods. Pl. 58, fig. 28.

Graceful, smooth or very lightly longitudinally striated, whitish, yellowish, or very light rosy, first three whorls with the slit filled below, afterwards it is open.

So. Australia, Tasmania.

Undetermined or Unfigured Species of Siliquaria.

S. COSTÆ, Cantraine.	*Mediterranean Sea.*
S. GLABRA, Risso (= the above?).	*Mediterranean.*
S. MOBII, Mörch.	*Manilla.*
S. GIGAS, Lesson.	*Moluccas.*
S. PAPILLOSA, Rees.	*Hab. unknown.*
S. SPIRALIS, Risso (? = *S. obtusa*, Schum.).	*Mediterranean.*
S. ANGUILLÆ, Mörch.	*West Indies.*
S. MODESTA, Dall.	*West Indies.*

Genus CRYPTOBIA, Desh., 1863.

The two species, MICHELINI and HETEROPSAMMARIUM, are not described or figured. *Isl. Reunion.*

Family *TURRITELLIDÆ.*

Animal with a short broad rostrum; long, subulate, diverging tentacles, the eyes slightly prominent at their external base; mantle margin fringed, slightly plicate or channeled in front and on the right side; branchial plume single, very long; foot very short, truncate in front, attenuated and obtuse behind, grooved beneath, operculigerous lobe simple.

The lingual dentition varies in the number of margined teeth; thus for *T. acicula*, the marginals are suppressed, and the formula is 0–1–1–1–0 (Pl. 59, fig. 30); for *T. ungulina*, 2–1–1–1–2, (Pl. 30, fig. 11), and for *T. triplicata* 3–1–1–1–3 (Pl. 59, fig. 29). *T. lactea*, representing the group Mesalia, has the marginal teeth with smooth edges, formula 2–1–1–1–2 (Pl. 30, fig. 12).

Shell spiral, not umbilicated, spire very long, of numerous whorls, with revolving striæ or carinations, and curved growth-striæ; mouth obliquely oval or subquadrangular, usually entire, lip not thickened. Operculum multispiral.

The genus Eglisia, Gray, 1840, included by many conchologists in this family, belongs apparently to the Scalariidæ. Von Maltzan has recently described a genus Smithia, 1883, which is said to have a multispiral operculum, and is placed by him in Turritellidæ, yet in the scalariform whorls, depressed superior portion, etc., it appears to be simply an exaggeration of the characters of Eglisia; and it is connected with that group by Fischer.

The Turritellidæ have been monographed by:

Kiener. Coquilles vivantes. 34 species.

Reeve. Conchologia Iconica. 68 species. 1849.

Boury has monographed the genus Mathilda, in Journal de Conchyliologie, 1883.

Synopsis of Genera.

Genus TURRITELLA, Lam., 1799.

Shell pyramidal, the numerous whorls spirally striated or ridged, crossed by arcuated growth-lines, spire very long, aperture oval or subquadrangular, entire, lip thin. Operculum with fimbriated margin.

UNIVERSITY CALIFORNIA

About a hundred species are known, inhabiting all seas, but principally tropical and subtropical. The fossils number about four hundred species; the genus commenced in the trias.

The genus Proto, Defrance, 1824, is probably founded on a young Turritella: Proto of authors (Protoma, Baird) is different.

Section I. TURRITELLA (restricted).

Whorls rounded, spirally striate, unicolored, aperture rounded.

Section II. HAUSTATOR, Montfort, 1810.

Whorls flattened, mouth subquadrangular, outer lip sinuous; usually undulatingly strigate with chestnut-color.

Section III. TORCULA, Gray, 1847.

Shell turriculated, usually white or horn-colored with faint strigations of chestnut-color; whorls subangular, with a median excavation; aperture subquadrangular, the outer lip with a slight median sinus.

Section IV. ZARIA, Gray, 1847.

Shell turriculated, without color markings; whorls carinated; aperture subquadrangular, outer lip simple.

Section V. TURRITELLOPSIS, Sars, 1878.

Shell like Turritella, the whorls of the spire grooved across; aperture oval. The radula is without marginal teeth. Inhabits boreal seas. *Tachyrhynchus*, Mörch., 1868, separated from *Mesalia* by a slight difference in the operculum, is a synonym. I do not adopt it instead of *Turritellopsis* because the real differences of radula, size and habitat are not mentioned.

Subgenus MESALIA, Gray, 1842.

Shell turritelliform, the last whorl rounded; aperture oval, slightly produced in front into a rudimentary channel, lip sharp, arcuated, slightly sinuous behind, columella flattened, a little twisted at the base. Operculum with fewer whorls than in Turritella, the nucleus central. Lateral and marginal teeth of the radula with smooth edges.

West Africa; fossil in the Eocene.

Subgenus ARCOTIA, Stoliczka, 1868.

Turreted, elongated, spirally striate, the incremental lines straight, not curved; columella excavated, aperture angulately rounded, subeffuse anteriorly.

Jurassic and Cretaceous of *India*. T. INDICA, Stol. (S. and S. Conch., t. 67, f. 64).

Subgenus LITHOTROCHUS, Conrad.

Shell having the appearance of an elongated Trochus; spire obtuse, the whorls numerous, transversely grooved, last whorl carinated, smaller than the spire; there is a thickened sutural band, with very numerous growth-striæ; aperture subtetragonal, entire.

Lias of *Chili*. T. HUMBOLDTII, Buch (S. and S. Conch. t. 67, f. 66).

Genus PROTOMA, Baird, 1870.

Shell turreted, with flattened whorls, aperture oval, narrowly channeled and excised in front, with a basal swelling and a fasciole around the excision, lip sinuous behind. Operculum circular, corneous, multispiral.

A single recent species is known, from *West Africa*.

This is the genus Proto, of authors, not Defrance, represented in the Miocene of Europe.

? Genus GLAUCONIA, Geibel, 1852.

Shell turriculated, conical, sometimes pupiform, the whorls less numerous than in Turritella, and crossed by costulations; outer lip notched or sinuated by an impressed furrow which winds round the last whorl; aperture rounded, continuous; columella usually distinctly umbilicated. There are about 30 cretaceous species, *Europe*, *India* and *America*. *Omphalia*, Zekeli, 1852 (not Omphalius, Phil.), and *Cassiope*, Coquand, 1866, are synonyms.

Usually considered a member of this family, but is remarkably allied to Melanatria.

Genus MATHILDA, Semper, 1865.

Shell turriculated, rather solid, apex heterostrophe, abruptly turned from left to right; whorls in the typical species transversely cingulated and reticulated, longitudinally striated; aperture entire, subrotund, base sometimes subeffuse; lip acute, columella smooth. Operculum corneous, rather solid, multispiral, the external face concave, nucleus central.

Animal with very long thread-like, divergent tentacles, with rather large eyes on prominences upon their exterior side, about a quarter of their length from the base; foot large, cut out in front, obtuse behind; operculigerous lobe having a row of cilia in constant movement.

Seas of Europe, China, Australia, Strait of Magellan.

There are about thirty tertiary and a few secondary species.

"Mathilda," writes Dr. Fischer, "has the shell of Turritella, with the heterostrophe embryonic whorls of Pyramidella; the exterior form of the animal, the position of the eyes, and the structure of the operculum, relate it to the former." On the other hand, Monterosato finds in it affinities with Solarium, and Jeffreys places it in the Pyramidellidæ. The radula is unfortunately unknown.

Subgenus Geganta, Jeffreys, 1884.

Shell small, conic, reticulated, imperforate, the nucleus globular and twisted, not spiral and not sinistral. G. pinguis, Jeffr.

Coast of Portugal (abyssal).

Differs from Mathilda in its short spire and non-heterostrophe apex.

Genus TURRITELLA, Lam., 1799.

Section Turritella (typical).

T. terebra, Linn. Pl. 59, figs. 32, 33.

Whorls convex, each with about 6 revolving ridges and intermediate close striæ, suture deep; yellowish brown to chestnut-color. Length, 5–8 inches.

Singapore, Java, Philippines.

T. Archimedis, Dillwyn, is a synonym, and *T. spectrum*, Reeve (fig. 33), is at most a variety, developing more numerous ridges.

T. BACILLUM, Kiener. Pl. 59, figs. 34, 35; Pl. 60, fig. 42.

Whorls somewhat flattened in the middle, but with deep suture, with about 6 revolving ridges and fine intermediate striæ; light yellowish ash to chestnut-color, the ridges on the larger whorls often marked by darker lines. Length, 4–5 inches.

Ceylon, China.

This is possibly only a variety of *T. terebra*, the essential difference being that its whorls are somewhat flattened in the middle.

T. cerea, Reeve (fig. 35) is a synonym. In the darker colored specimens, called *T. crocea*, by Kiener (fig. 42), there is often a more or less defined lighter colored sutural band.

T. UNGULINA, Linn. Pl. 60, fig. 43.

Whorls about fifteen, convex, rather smooth, with about ten low ridge-like striæ, the interstices superficially striulate; chestnut-color, becoming dark chocolate towards the aperture.

Length, 3 inches.

T. fuscata, Lam., is a synonym. *West Africa.*

T. NIVEA, Gray. Pl. 60, fig. 44.

Whorls about 20, convex, a little slopingly flattened around the upper part, encircled by seven to ten low ridges and intermediate striæ. Length, 3·5 inches.

East Coast of Africa.

I have some doubt about the correctness of the locality assigned for this species, and think it very probable that it will prove to be a colorless variety of *T. ungulina*. In one of the specimens before me the spire is chestnut-tinted.

T. COMMUNIS, Risso. Pl. 60, figs. 45, 46.

Whorls about 15, convex or somewhat flattened, the last sometimes with an obtuse angle below, with spiral slight ridges and intermediate striæ, often several of the ridges stronger; yellowish brown to rusty chestnut color, often variegated in irregular longitudinal stripes, interior of aperture usually purplish tinged.

Length, 2 inches.

Europe.

The nomenclature of this species is somewhat involved. It is

T. terebra of Linn. Faun. Suec., but not of the Systema, and some conchologists prefer this name; it is more frequently known, however, as *T. cornea*, Lam., although its identification is not beyond question. Other synonyms are *T. ungulina*, Lovén, etc. (not Linn.), *T. Linnæi*, Deshayes, and *T. imbricosoluta*, Gregorio, the latter described as a variety.

T. CAPENSIS, Krauss. Pl. 60, fig. 47.

Whorls about 15, rounded, brownish, white-clouded, with irregular obtuse revolving lines and deep suture, base a little angulated, aperture light brownish. Length, 28 mill.

Cape of Good Hope.

T. TRIPLICATA, Studer. Pl. 60, figs. 48–50.

Whorls 15, with deep suture, spirally striated, three-ribbed, ribs flattened, the middle one the largest, the upper one smallest, duplicate, and sometimes obsolete towards the apex; whitish, variegated and flamed with chestnut, sometimes all chestnut.

Length, 1–1·5 inches.

Mediterranean Sea; West Africa; Canary Is., Coast of Spain.

Includes *T. incrassata*, Sowb., *T. tricarinata*, Brocchi.

Var. TURBONA, Monts. Fig. 50.

Shell larger, bicarinate. *Near Civita Vecchia.*

T. FASCIALIS, Menke. Pl. 59, figs. 36, 37.

Very slender; whorls about 18, convex, four-ridged, suture deeply impressed; yellowish, chestnut banded at the suture.

Length, 1 inch.

Japan, China Sea.

Menke described his species without locality; the shell which Reeve has figured for it is said, on the authority of Cuming, to have been dredged in "Bay of Montija, Central America (in coarse sand at the depth of seven fathoms)." That this habitat is an error can scarcely be doubted; not only has the locality failed to yield additional specimens, but Mr. A. Adams has recognized in the figure a Japanese species of which the unfigured *T. gracillima*, Gould, of Japan, likewise, is a synonym. My type specimens of the latter confirm this. *T. bicolor*, Ad. and Reeve (fig. 37), is another synonym.

T. CINGULIFERA, Sowb. Pl. 59, figs. 38–41.

Slender, with about twelve whorls, contracted beneath the deep suture, then rounded, with a number of thin, elevated spiral striæ; whitish to yellowish brown, chestnut banded next the suture, sometimes with undulating transverse chestnut lines or a central chestnut band made up of two or three close parallel lines on the last whorl. Length, ·75 inch.

Australia.

The type is lighter colored than usual; *T. fragilis*, Kiener (fig. 39), better represents the ordinary appearance of the species, whilst *T. fusco-cincta* Petit (fig. 40) is a variety with different development of the ridging, and *T. parva*, Angas (fig. 41), is a juvenile.

Section HAUSTATOR, Montfort, 1810.

T. GONIOSTOMA, Val. Pl. 60, figs. 51, 52; Pl. 61, figs. 53–57.

Whorls 18 to 20, flattened in the middle, with fine spiral striæ, and sometimes a few more prominent ridges; when the latter are present they usually define the flattened area above and below, with occasionally some intermediate ridges upon the area, and a number of stronger ridges on the base of the body-whorl; ridges sometimes irregularly nodulous; first whorls of the spire unicarinate in the middle; whitish, thickly marbled, speckled and irregularly strigate with chestnut or chocolate-color. Length, 4–6 inches.

Payta, *Peru* to *Mazatlan*.

The synonyms include *T. Broderipiana*, d'Orb. (fig. 53), and *T. Californica*, Brod. (teste d'Orb.); *T. marmorata*, Kiener (fig. 54); *T. lentiginosa*, Reeve (fig. 55); *T. punctata*, Kiener (fig. 56), and *T. Banksii*, Reeve (fig. 57), a juvenile. This list comprises shells nearly smooth, and those with strong revolving ridges, also both slim and stout specimens, and shows a variability which, if common to other species of the genus, would largely reduce their number. The specimens before me fully suffice to make out the synonymy as I have given it.

T. VARIEGATA, Linn. Pl. 61, fig. 58: Pl. 62, figs. 63, 64.

Whorls 15 or 16, the first few carinated in the middle, the rest flattened, swollen above the suture, with four or five distant

obsoletely granulated ridges, and intermediate fine striæ; whitish, boldly longitudinally clouded and strigated with chocolate-color.

Length, 2·5–4 inches.

West Indies.

The difference between this and the preceding species is mainly locality, yet the clouded painting is usually of a bolder pattern. The *T. goniostoma* and all its varieties might be united with this without injury to science.

This is *T. terebra*, Donovan; *T. marmorata*, Chemn., perhaps *T. meta*, Reeve (fig. 63), and *T. imbricata*, Linn., figured by Reeve as var. *elongata* (fig. 64).

T. TIGRINA, Kiener. Pl. 62, figs. 65, 66.

Whorls 18–20, rather narrow, flatly sloping, swollen below and obtusely angulated, encircled by eight to ten riblets and intervening close striæ, suture deep; whitish, longitudinally irregularly strigate with dark chestnut or chocolate-color.

Length, 3–4·5 inches.

Panama to *Mazatlan.*

The more scalariform whorls and more definite obliquely longitudinal painting distinguish this from the preceding species; the upper whorls, also, have no central carina. *T. Cumingii*, Reeve (fig. 66), is a synonym.

T. ROSEA, Quoy. Pl. 62, figs. 67, 68; Pl. 61, fig. 59.

Whorls about 15, flat, the last sharply angled around the base, the angle defined by a rib, above which is another rib; encircled by rather close, raised striæ, finer on the base; yellowish, marbled with chestnut, the raised striæ usually darker chestnut. Length, 2–2·5 inches. *New Zealand.*

T. lineolata, Kiener (fig. 68), is described from a light colored or faded specimen. The coloring of none of the specimens before me justifies Quoy's specific name. I think that *T. Hanleyana*, Reeve (fig. 59), will prove to be a young specimen of this species.

T. SANGUINEA, Reeve. Pl. 62, fig. 69.

Whorls 18–20, slopingly convex to an angle above the deep suture, spirally grooved, with wider, flat-topped ridges; whitish variegated on the ridges with transverse oblong chestnut-colored markings. Length, 2–3 inches. *Gulf of California.*

T. DECLIVIS, Ad. and Reeve. Pl. 62, fig. 70.

Whorls about 18, flatly slanting to an angle above the suture, nearly smooth, very finely undulately striated, plicate in the middle, towards the apex; yellowish white, stained with livid brown, the earlier whorls spotted with brown in a row beneath the suture. Length, 2 inches.

China Sea.

T. SINUATA, Reeve. Pl. 61, fig. 60.

Whorls 14, flattened, finely spirally ridged and striated, lip deeply sinuous; light fulvous, with a red-dotted white zone beneath the suture. Length, ·65 inch.

Hab. unknown.

T. CINGULATA, Sowb. Pl. 62, fig. 71.

Whorls about 17, convexly flattened, spirally strongly three-ribbed, often with alternate smaller riblets, ribs usually granosely crenulated, suture deep; whitish, the ribs very dark chocolate or nearly black, aperture numerously chocolate banded. *T. tricarinata*, King, is a synonym. *Chili.*

T. COLUMNARIS, Kiener. Pl. 63, fig. 76.

Whorls about 30, narrow, the earlier ones showing two approximate keels in the middle, the rest rather flattened and about ten-ridged, the ridges obsoletely granulated, with intermediate fine striæ, suture excavated; yellowish white, with light chestnut-colored waved longitudinal streaks. Length, 4 inches.

Ceylon.

T. LEUCOSTOMA, Val. Pl. 62, fig. 72.

Whorls about 20, very narrow, contracted around the excavated suture, flattened, spirally about 6-ridged, the ridges narrow, rather distant, granose, the interstices very finely striated; whitish, faintly longitudinally clouded with light chestnut, ridges chestnut-spotted. Length, 3 inches.

West Coast of Central America.

T. COOPERI, Carp. Pl. 61, fig. 61.

Whorls about 17, slopingly flattened, excavated at the suture, two-ridged and finely striated spirally, the last whorl doubly ridged below, with a single ridge above; yellowish, longitudinally flamed with chestnut or chocolate. Length, 1·75 inches.

Southern California.

T. RUBESCENS, Reeve. Pl. 61, fig. 62.

Acuminately turreted; whorls 13, spirally closely ridged and striated, the first few whorls keeled in the middle, keel quickly vanishing; light red. Length, ·65 inch.

Bay of Montija, West Columbia.

All the whorls are somewhat prominent in the middle, occupied by the keel in the first few whorls.

The above is Reeve's description of a young shell which does not appear to possess any special characteristics; it will possibly prove identical with one of the larger species from the same region.

T. FLAMMULATA, Kiener. Pl. 62, fig. 73.

Whorls 18, the earlier ones two-ridged, the rest convex, seven-ribbed, the middle ribs broader; fulvous white, stained with rose, dotted and clouded with chestnut, base rose color.

Length, 2·75 inches.

West Africa.

T. TORULOSA, Kiener. Pl. 62, fig. 74.

Whorls 15, flatly convex, the earlier ones two-ridged, afterwards becoming four-ridged, ridges obsoletely granulated, two lower ones always the most prominent, interstices closely spirally striate; light yellowish white dotted and longitudinally flamed with light chestnut. Length, 3 inches.

? Red Sea.

Is possibly a mere variety of the following species.

T. TRISULCATA, Lam. Pl. 63, fig. 75.

Whorls about 18, conspicuously three-ribbed, the intermediate grooves hollowed, striated; whitish, violaceous towards the apex, sparsely longitudinally flamed with chestnut.

Length, 2·5 inches.

Red Sea.

T. RADULA, Kiener. Pl. 63, fig. 77.

Whorls about 22, doubly ridged above and below, the wide intermediate space concave, striated, ridges, except the lowest, rather obsoletely granose, last whorl sometimes lamellated; light brownish, spotted, strigated and flamed with chestnut.

Length, 2·75 inches.

Bay of Guayaquil.

T. NODULOSA, King. Pl. 63, figs. 78–80.

Whorls 14 or 15, nodulously ridged, a central ridge usually stronger, making an angulation, concave and striate in the middle; light yellowish brown, longitudinally chestnut-flamed between the nodules Length, 2 inches.

Gulf of Dulce, Central America.

Perhaps only a variety of the preceding species. *T. papillosa*, Kiener (fig. 80), is a synonym.

T. AQUILA, Ad. and Reeve. Pl. 63, fig. 81.

Whorls 14–15, concavely sloping around the upper part, then somewhat obscurely broadly two-ribbed, conspicuously engraved throughout with grooved striæ, last whorl neatly ridged and striated beneath; swarthy brown, obliquely spotted and streaked with reddish chestnut. Length, 1·6 inches.

Nagasaki Bay, Japan.

"The painting of this species has rather a dotted appearance from its being everywhere cut through by the striate grooves." —REEVE.

C. BICINGULATA, Lam. Pl. 63, fig. 82.

Whorls about 18, each bearing two strong, rounded, nodulous ribs, separated by a narrow, concave groove, which is closely striated, base concentrically ridged; yellowish or purplish white, thickly covered with purple-chestnut longitudinal flames, aperture maculated purplish. Length, 2·5–3 inches.

Cape Verd Is.

It is *T. biangulata*, Blainv.

T. MACULATA, Reeve. Pl. 63, fig. 83.

Differs from the preceding species in the keels of the earlier whorls being comparatively obsolete, the base of the shell more concave, and marked by numerous colored linear striæ, which are continued over the whole shell. There is none of the bold blotchy painting which distinguishes *T. bicingulata*, but the upper margin of the whorls has a row of irregular chestnut spots immediately beneath the suture. Length, 2·75 inches.

China Sea.

T. KNYSNAENSIS, Krauss. Pl. 63, fig. 84.

Whorls 17, convex, with profound suture, with two approximate central keels (three on last whorl), and narrower spiral lines; whitish marbled and longitudinally strigate with chestnut.

Length, 1 inch.

Cape of Good Hope.

T. ANNULATA, Kiener. Pl. 63, fig. 85.

Whorls 20, sloping above, then two-keeled with a narrow intervening sulcus, closely striate, the striæ above and below the keels stronger than in the sulcus; yellowish white, obscurely longitudinally flamed with light chestnut.

Length, 2·75 inches.

West Africa.

T. GUNNII, Reeve. Pl. 63, figs. 86, 87.

Whorls 18, flattened, irregularly inconspicuously ridged and striated, suture excavated; whitish, with chestnut-colored waved flames, aperture light purplish. Length, 2 inches.

Tasmania, Australia.

Var. TASMANICA, Reeve. Fig. 87.

Whorls 15, rather flattened, ridged at the lower edge, encircled with two ridges and intermediate striæ above, interstices very closely decussated with minute oblique raised striæ.

T. INCISA, Reeve. Pl. 63, fig. 88.

Whorls 12, flatly convex, concavely angled at the base, spirally very closely marked with engraved striæ; ash-brown.

Length, ·75 inch.

Sydney, Australia.

T. INFRACONSTRICTA, Smith. Pl. 63, fig. 89.

Whorls about 20, convexly flattened, with excavated suture, finely lirated and two-ridged; brownish white, minutely dotted with chocolate-color on the liræ. Length, 2 inches.

Andaman Is.

T. HASTULA, Reeve. Pl. 64, fig. 93.

Whorls 22–23, slender, flatly convex, concentrically plicately wrinkled, last whorl swollen at the base, with the wrinkles obsolete, all the whorls spirally impressly striated, the intermediate ridges being obsoletely granulated; ash-white, arcuately streaked and variegated with purple-brown. Length, 2·25 inches.

Hab. unknown.

T. VITTULATA, Adams and Reeve. Pl. 63, figs. 90, 91.

Whorls 12, flatly convex, with deep suture, spirally sharply six-ridged and striated, the interstices showing oblique longitudinal striæ, ridges thin, the two lower ones more prominent; yellowish white to light brown, irregularly interruptedly stained with chestnut. Length, ·75 inch.

China Sea.

T. canaliculata, Ad. and Reeve (fig. 91), is a bleached specimen of this species.

T. MULTILIRATA, Ad. and Reeve. Pl. 64, fig. 97.

Shell delicate, translucent, whorls contracted round the upper part, gently slanting below, channeled round the lower part, spirally many-ridged, ridges very finely granulated; pellucid, white. Length, 1 inch.

China Sea.

Although described as white, the original figure is decidedly colored a light violaceous brown.

T. FASTIGIATA, Ad. and Reeve. Pl. 63, fig. 92.

Whorls 18–20, narrow, convex, contracted above, slanting, then rounded, very finely ridged and striated, two-keeled towards the apex; variegated with pale violet and white, and oblique brownish streaks, ridges dotted or articulated with light brown. Length, 1·75 inches.

China Sea.

T. CONGELATA, Ad. and Reeve. Pl. 64, fig. 94.

Whorls 16, convexly flattened, smooth, obscurely three-ridged, ridges narrow, distant; translucent white. Length, ·75 inch.

China Sea.

T. PAGODA, Reeve. Pl. 64, fig. 95.

Whorls 14–15, slantingly flattened, spirally sharply ridged, conspicuously encircled with a single sharp rib below, paired on the body-whorl, first few whorls two-ribbed; whitish, obscurely flamed with light fulvous. Length, ·8 inch. *New Zealand.*

T. CANDIDA, Reeve. Pl. 64, fig. 96.

Whorls 18, spirally ridged, at first two-keeled around the upper part, concave in the middle, then with a single keel, two last whorls four-keeled, suture excavated; white, without markings. Length, 2 inches. *Hab. unknown.*

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T. DECIPIENS, Monts. Pl. 64, fig. 3.

Whorls about 10, convexly flattened, the suture slightly marked, with crowded revolving lines, the earlier whorls carinate in the middle, afterwards becoming indistinct, the middle line a little more prominent than the others, base concave, defined by a sharp angle; light yellowish brown to chestnut-brown, with fine flexuous chestnut stripes and spots. Length, 1 inch.

Gabes, Tunis.

It is *T. subangulata*, Auct., not Brocchi.

T. ALBA, H. Adams. Pl. 64, fig. 4.

Turreted, thin, white; whorls 12, carinated in the middle, the last whorl bicarinate, with a broad intervening flattened space, a little concave, everywhere spirally striate. Length, 14 mill.

Red Sea.

Apparently a young shell.

Section TORCULA, Gray, 1847.

T. EXOLETA, Linn. Pl. 64, figs. 98–1.

Whorls 16 or 17, rudely ridged above and below, the broad intermediate space concavely excavated, and sometimes crossed by thin lamellæ, lower rib of body-whorl double; margin of the aperture sinuated in the middle; yellowish white, obscurely longitudinally flamed with light chestnut, more conspicuous on the ridges. Length, 2–2·5 inches.

West Indies.

The longitudinal septæ are frequently wanting. It is *T. torcularis*, Born, and *T. obsoleta*, Gmel. I regard *T. cochlea*, Reeve (fig. 100), as a specimen accidentally less closely coiled than usual, so that the paired lower ribs are exhibited on several of the whorls. *T. excavata*, Sowb. (fig. 1), said to come from Agulhas Bank, So. Africa, is also a synonym.

T. MONILIFERA, Adams and Reeve. Pl. 64, fig. 5.

Whorls 15, stout, with upper and lower moderate ridges and a slightly concave wide middle space, lower carina doubled in the body-whorl; pinkish white, upper ridge with chestnut spots. Length, 1·25 inches.

China Sea.

T. CLATHRATA, Kiener. Pl. 64, figs. 2, 16.

Whorls 18, narrow, flattened, smooth, strongly two-keeled, with intermediate sulcus, and sloping concave surface to the suture above; fulvous, obscurely marked with spots or stripes of chestnut, keels paler. Length 1·75 inches.

Australia.

With this species I unite *T. constricta*, Reeve (fig. 16).

T. CONCAVA, Martens. Pl. 64, fig. 6.

Whorls about 10, alabaster white, obliquely striulate, the first two whorls smooth, the rest bicarinate, the carinæ indistinct, the lower one at the suture, base concave, margin of aperture deeply sinuated. Length, 16 mill.

Mauritius.

T. CARINIFERA, Lam. Pl. 64, fig. 7.

Whorls 15, stout, turreted, slanting on the upper part, then encircled by two stout carinæ, with an intermediate shallow sulcus, everywhere finely, undulately, spirally striate; white, sometimes with a violaceous tint. Length, 3·75 inches.

? Cape of Good Hope.

T. GEMMATA, Reeve. Pl. 64, fig. 8.

Whorls about 15, with two granulated approximate ridges next the suture, and a single plain ridge at the base, concave in the middle; white, faintly stained here and there with light orange brown. Length, 1·5 inches.

Hab. unknown.

T. HOOKERI, Reeve. Pl. 64, fig. 9.

Whorls 15, rather thin, with two sharp, remote keels and slightly concave interval, lower keel doubled on the body whorl; translucent white. Length, 22 mill.

Hab. unknown.

T. ACUTA, Tenison-Woods. Pl. 64, fig. 10.

Whorls 12, narrow, flat, the earlier ones smooth, then encircled by a couple of slight ridges, and smaller elevated lines, the surface between the ridges slightly concave; yellowish white, obscurely marked with chestnut. Length, 28 mill.

Tasmania.

Figured from a specimen.

Section ZARIA, Gray, 1847.

T. DUPLICATA, Linn. Pl. 65, figs. 20–22.

Whorls about 16, stout, ponderous, the first few with several subequal keels, afterwards first one keel and then a pair of them are developed more strongly, whilst the others become faint or obsolete, everywhere closely spirally striate; fulvous cream color, becoming light chestnut towards the apex. Length, 5–6 inches.

Indian Ocean.

T. replicata and *T. acutangula*, Linn. (fig. 21), are synonyms. In the latter the second prominent keel is not developed.

Var. ATTENUATA, Reeve. Fig. 22.

Reeve attempts to distinguish this from *T. acutangula* by the want of the single prominent keel, but the variations between these forms are infinite, so that *attenuata* can barely stand as a variety. *T. acutangula*, Desh., not Linn., is a variety.

T. FERRUGINEA, Reeve. Pl. 64, fig. 11.

Whorls 16, convex, finely spirally ridged, first whorls two-keeled, keels gradually fading, the lower whorls becoming obtusely subangulated below the middle; whitish, longitudinally undulately strigate with chestnut. Length, 3·75 inches.

Hab. unknown.

T. AUSTRALIS, Lam. Pl. 65, fig. 23.

Whorls about 12, with deep suture, encircled by a prominent central nodulous carina, and a less prominent subnodulous one below the suture, spirally striate; yellowish brown, brown banded on the base. Length, 1 inch. *Australia, Tasmania.*

T. granulifera, Woods, is a synonym.

Section TURRITELLOPSIS, Sars, 1878.

T. ACICULA, Stimpson. Pl. 64, fig. 12.

Small, turreted, subulate, thin, white; whorls 10, very convex, longitudinally striate and spirally ribbed; aperture rounded, effuse anteriorly, peristome acute. Length, 5 mill.

Cape Cod, northwards; Norway to Sitka.

Distinguished from the young of *T. erosa* by its much more convex whorls and prominent ribs. *T. tenuisculpta*, Carp., is a synonym.

T. EROSA, Couth. Pl. 64, figs. 13, 14.

Whorls 9–11, rather flat, sloping towards the suture, with from three to five narrow revolving grooves, apex generally eroded; yellowish brown. Length, 12·5 mill.

Massachusetts to Greenland, Alaska.

T. polaris, Beck, and *T. Eschrichtii*, Midd. (fig. 14), are synonyms. In the Arctic regions the species attains double the above dimensions.

T. RETICULATA, Mighels and Adams. Pl. 64, figs. 15, 19; Pl. 65, figs. 24–26.

More slender than the preceding form; whorls 11–12, rounded, with three to five spiral striæ, and longitudinal folds; yellowish brown. Length, 17 mill.

Maine to Greenland, Alaska.

T. costulata, Mighels and Adams (fig. 24), *M. lactea*, Möller (fig. 25), *T. lacteola*, Carp., and *T. erosa*, var. *costata*, Aurivillius (fig. 26), are synonyms. The latter author appears to consider the present species identical with *T. erosa:* as Arctic shells are very variable, this may be the case; yet I can readily distinguish the two species among the numerous specimens before me.

Var. DECLIVIS, Aurivillius. Fig. 19.

Shell without sculpture, Length, 27·5 mill.

Unfigured, Undetermined and Spurious Species.

T. RUNCINATA, T. ACCISA, T. CARLOTTÆ, T. CORDISMEI, T. LAMELLOSA, Watson. *S. E. Australia.*

T. ADMIRABILIS, Watson. *Admiralty Islands.*

T. DELICIOSA, Watson. *N. Australia.*

T. AUSTRINA, Watson. *Kerguelen Isl.*

T. PHILIPPENSIS, Watson. *Pt. Philip, Australia.*

T. AREOLATA, Stimpson. =*Turbonilla.*

T. PUSILLA, Jeffreys. Not a Turritella.

T. YUCATANUM, Dall. *Yucatan Strait*, 640 fms.

T. FULMINATA, T. VITTATA, Hutton. *New Zealand.*

T. SOPHIÆ, Brazier (*T. incisa*, Woods, not Reeve). *Pt. Jackson, Australia.*

T. AUREOCINCTA, Martens. *Friendly Islands.*

T. SUBSQUAMOSA, Dunker. *Bass Strait, Australia.*
T. DURA, Mörch. *Realejo, Centr. Am.*
T. GRANOSA, Quoy. Not a Turritella.
T. CERITHIUM, Quoy. =*Cerithium.*
T. VIRGINIANA, Lam. (?) *Virginia.*
T. TRICINGULATA, Anton., T. NIVEA, Anton. *No locality.*
T. SPINA, Crosse and Fischer. *Australia.*
T. PUNCTICULATA, Sowb. *Agulhas Bank, So. Africa.*
T. IMPRESSA, Say, T. BISUTURALIS, Say. =*Odostomia.*
T. NEBULOSA, Kiener. Not a Turritella.
T. TASMANICA, Tenison-Woods. *Tasmania.*
T. CONCAVA, Say, T. ALTERNATA, Say. =*Terebra.*
T. ÆQUALIS, Say. =*Turbonilla.*
T. TRICINCTA, Hutton. Described as a tertiary fossil, but is also living. *T. symmetrica*, Hutton and *T. rosea*, Mantell (not Quoy), are synonyms. *N. Zealand.*

Subgenus MESALIA, Gray, 1842.

T. BREVIALIS, Lam. Pl. 65, figs. 27–29.

Whorls 15, convex, five-ridged, the upper one often forming a sutural margin, lower ones frequently faint, interstices finely closely striated; aperture a little effuse below; white, ash-color or brownish olivaceous, aperture often violaceous.

Length, 2–2·5 inches.

Northern and Western Africa.

The synonymy includes *T. mesal*, Deshayes; *T. sulcata*, Gray; *T. suturalis*, Forbes.

T. VARIA, Kiener. Pl. 65, figs. 30, 31.

Whorls 12, convex, about five-ridged; yellowish white to violet ash-color, interior brownish. Length, 1 inch.

West Africa, Cuba.

T. Caribæa, d'Orb. (fig. 31), from the latter locality, appears to be identical; it remains to ascertain whether this species is really distinct, or only a small variety of *T. brevialis.*

T. MELANOIDES, Reeve. Pl. 65, fig. 32.

Whorls 10, slightly concave at the upper part, obliquely longitudinally plicately ribbed, decussated with numerous spiral striæ

and distant ridges, suture impressed; whitish, sparsely dotted with chestnut. Length, 1·65 inches.

Hab. unknown.

T. OPALINA, Adams and Reeve. Pl. 65, fig. 33.

Whorls 12, rounded, stout, a little constricted above to a sutural fasciole, smooth, very minutely striate; yellowish white, with light chestnut curved longitudinal stripes. Length, 1 inch.

China Sea.

Unfigured Species of Mesalia.

T. PLICATA, A. Ad. *Teneriffe.*
T. DECUSSATA, A. Ad. *Philippines.*
T. FREYTAGI, Maltzan. *W. Africa.*

Genus PROTOMA, Baird, 1870.

P. KNOCKERI, Baird. Pl. 65, figs. 34, 35.

Elongate subulate, transversely, narrowly closely sulcate; whorls 16, flattened, with well-impressed suture, base of shell with a spiral fasciole ending in a deep incision of the base of the aperture; white or brown. Length, 2·5 inches.

Whydah, W. Coast of Africa.

Genus MATHILDA, Semper, 1865.

M. ELEGANTISSIMA, Costa. Pl. 65, fig. 36; Pl. 64, figs. 17, 18.

Whorls 9, turreted, with rounded spiral ribs more or less granulated by longitudinal lines, suture narrowly channeled; brownish. Diam. 11 mill.

Mediterranean.

M. cochlæformis (fig. 36), *M. granolirata* (fig. 17), and *M. retusa* (fig. 18), Costa, and *M. funiculata*, Tiberi, are synonyms.

M. ELEGANTULA, Angas. Pl. 65, fig. 37.

Whorls 14, thin, translucent, nearly flat, whitish, each with three rounded spiral ribs, the one next the suture smallest, between the ribs finely longitudinally striate, striæ raised and very thin, base of last whorl smooth and flattened; nuclear whorl sinistral. Length, 11 mill.

Port Jackson, Australia.

M. QUADRICINCTA, Brocchi. Pl. 65, fig. 38.

Whorls carinated, turreted, convex, encircled by four narrow crenulated spiral ridges, the interstices longitudinally striate.

Mediterranean.

Described from an Italian tertiary fossil. *Eglisia Macandreæ*, H. Adams, is a synonym.

M. SINENSIS, Fischer. Pl. 65, fig. 19.

Whorls 11, elongated turreted, rather thick, embryonal ones smooth, the others turriculate, subcarinate, cancellate, with deep suture, traversed by four spiral ribs, the interstices longitudinally costate; yellowish. Length, 6 mill.

Isle of Chusan, China Sea.

Unfigured Species.

M. TROCHLEA, Mörch. *St. Thomas, W. I.*

M. MAGELLANICA, Fischer. *Sts. Magellan.*

M. CORONATA, Monts. *Mediterranean.*

Subgenus GEGANIA, Jeffreys, 1884.

M. PINGUIS, Jeffreys. Unfigured. *Coast of Portugal.*

Family *CÆCIDÆ*.

Shell tubular, with a spiral plane nucleus which is caducous or persistent, then becoming cylindrical, curved, terminating in a simple, circular aperture, the posterior portion of the tube usually divided by one or more septa (Pl. 66, figs. 47–51). Operculum horny, multispiral, margin sometimes fimbriated. There are usually three stages of growth in the shell of Cæcum: first, the spiral or nuclear, soon lost by truncation, the end of the remaining tube closed by a septum; second, the adolescent stage, a curved tube, also lost subsequently; and, third, the adult tube, of similar curved shape, and again closed behind by a septum (Pl. 66, fig. 39). In Strebloceras the three stages of growth are persistent and the septa consequently absent.

Animal with a long flat rostrum; tentacles cylindrical, with sessile eyes at their outer base; mantle thick, fleshy, circular, closely embracing the neck; a single branchial plume; foot short, narrow, truncated in front, attenuated and obtuse behind. Dentition 2–1–2?

These minute mollusks have some points of resemblance with the Vermetidæ, but are always free and the foot is without the anterior tentacular projections which distinguish that family. The animal is not at all shy, and crawls with considerable vivacity.

The Cæcidæ, on account of their minuteness, have been neglected by collectors and students. No complete illustrated monograph of the family exists. P. P. Carpenter was the first naturalist to study them, and we are indebted to him for some of the subdivisions of the family at present recognized, as well as for others which must be relegated to the synonymy. Unfortunately the obvious distinctions of sculpture, often so characteristic of species and higher groups, have not the systematic importance here which Carpenter supposed them to have; the Marquis de Folin, the latest monographer of the group, having shown that the same species will sometimes vary from a smooth to a ribbed surface. For this reason, and also because most of the species have not been figured, our knowledge of them

remains very incomplete and unsatisfactory. About two hundred nominal species have been described, and they appear to inhabit temperate and warm seas, throughout the world, but are absent in cold waters. Some tertiary species have been discovered.

Two of the principal works in which the Marquis de Folin has described new species, namely, "Les Fonds de la Mer," and "Annales Soc. Linn. Maine et Loire," xi, are unfortunately inaccessible to me. The former publication is particularly important for its illustrations. The Librarian of the Philadelphia Academy has made several unsuccessful attempts to secure this work through the Academy's agents in Europe, and I am reluctantly compelled to do without it; my monograph is therefore necessarily very imperfect. On the other hand, I am able to give illustrations of a number of species of Carpenter and C. B. Adams hitherto unfigured.

Genus CÆCUM, Fleming, 1817.

This is the only genus; the diagnosis consequently corresponds with that of the family. *Odontina*, Zborzewsky, 1834; *Odontidium*, Phil., 1836; *Cornuoides*, Brown, 1827; *Brochus*, Brown, 1829; *Cæcalium*, Macgillivray; *Corniculina*, Münster; *Dentaliopsis*, Clarke; *Brochina*, Gray, 1857, are synonyms.

Costa has described the spiral portion only of the tube of a Cæcum, probably *Cæcum trachea*, under the name of *Spirolidium Mediterraneum*; but he included a second species in his genus, which appears to be a Parastrophia.

The septum of the various species has a prominence upon the external face, which is directed backwards and presents considerable variation in form.

Subgenus CÆCUM, sensu stricto.

Shell commencing with two or three whorls, planorboid (Pl. 66, figs. 41, 42), which are subsequently lost by truncation, and the posterior extremity of the adult curved tube closed by a diaphragm.

Brochina, Gray, was founded on a single specimen, insufficiently characterized by its convex operculum.

Carpenter established the sections *Elephantulum*, *Anellum* and *Fartulum*, but De Folin rejects these, because they are not in harmony with all the forms included in them and are insufficient to meet the present demands of science; he proposes instead:—

Section I. Levia. Shells smooth.
Section II. Annulata. Shells annulated.
Section III. Costulata. Shells ribbed longitudinally.
Section IV. Quadrilata. Shells cancellated.
Section V. Armata. Shells spinose.

Subgenus Meioceras, Carpenter, 1858.

Young shell loosely spiral, not in one plane (Pl. 66, fig. 43); the adult truncate behind, something like a cow's-horn, somewhat inflated, smooth, aperture oblique; operculum externally concave,

Most of the species occur on the east coast of America between Florida and Rio de la Plata.

Subgenus Streblocerας, Carpenter, 1858.

Shell not decollated and without septa, the permanent spiral nucleus lying in a plane obliquely perpendicular to the adult tube (Pl. 66, figs. 44, 45). Mostly fossil.

Subgenus Watsonia, de Folin, 1879.

Nucleus caducous, tube scarcely curved, conical, aperture round, very oblique, encircled by a strong rib.

Subgenus Parastrophia, de Folin, 1869.

Shell tubular, with a scarcely spiral and entirely posterior pointed nucleus, the embryonic shell only having disappeared, anterior part of tube inflated (Pl. 66, f. 46).

Moreletia, de Folin, 1868 (not Gray, 1855), and Spirolidium Costa (in part), are synonyms.

The feature of this group is the persistence of the second or adolescent stage of growth, in the adult typical Cæcum always lost by truncation. The posterior end is septate, but pointed.

Genus CÆCUM, Fleming, 1817.

Section I. Levia.

C. LÆVE, C. B. Ad. Pl. 66, fig. 52.

Shell rather obese, short, smooth, shining, subdiaphanous, tinged with brown, slightly contracted in front, the aperture oblique; operculum concave. Length, ·07 inch.

Panama to Mazatlan.

Folin has described vars. *subornatum* and *cylindrica*. The figure is from a specimen identified by P. P. Carpenter.

C. FARCIMEN, Cpr. Pl. 66, fig. 53.

Like *C. læve*, but whitish, aperture less contracted, more slender, septum submucronate; operculum with a spiral marginal rib. Length, ·064 inch. *Mazatlan.*

C. VITREUM, Cpr. Pl. 66, fig. 54.

Subelongate, vitreous, shining, a little tumid towards the oblique aperture, septum prominent, mucronate.

Length, ·073–·107 inch. *Teneriffe; Mediterranean Sea.*

C. Sardinianum, Folin, and *C. glabrum*, McAndrew, are synonyms.

Var. CLARKII, Carp. Pl. 66, fig. 55.

Shell smaller, straighter, septum ungulate, apex more obtuse. *Teneriffe.*

C. DEXTROVERSUM, Carp. Pl. 66, fig. 56.

Narrow, rather elongated, thin, septum tumid, submamillated, operculum concave. Length, ·092 inch. *Mazatlan.*

The specimen figured is a junior.

Var. ANTILLARUM, Carp.

A single young specimen was found in W. Indian sponge, not presenting any characters by which it can be separated from *C. dextroversum*. Why should it be designated by a varietal name?

C. GLABRUM, Mont. Pl. 66, fig. 57.

Shell narrow, thin, smooth, subdiaphanous, aperture not contracted, nor tumid, white, septum without appendage.

Length, ·68 inch. *Atlantic Coast of Europe.*

The operculum is externally convex, constituting it the type of Gray's group *Brochina*. The synonyms include *Dentalium minutum*, Linn.; *Brochus lævis*, Brown; *Cornuoides minor*, Brown (juvenile); *Odontidium levissimum*, Cantr.; *Brochus arcuatus*, Brown; *Vermiculum incurvatum*, Mont.

C. AURICULATUM, de Folin. Pl. 66, fig. 58.

Shell thin, hyaline, cylindrical, a little curved, white, septum with rounded projection, mouth encircled by a rib.

Length, ·075 inch. *Mediterranean Sea.*

This is *C. Chiereghinianum*, Brusina, and perhaps *Odontidium glabrum*, Cantr.

C. GLABRIFORMIS, Carp.

Like *C. glabrum*, but the septum more tumidly mamillate, nearly hemispherical. Length, ·073 inch.

Mazatlan; San Diego, Cal.

The shell is said not to differ from *C. glabrum*.

C. ACHIRONA, de Folin. Pl. 66, fig. 59.

Rather solid, yellowish, shining, transversely very minutely striated, towards the aperture a little inflated and whitish, aperture a little oblique, subcontracted below, septum large, mamillated, subungulate. Operculum slightly convex, doubly margined.

Length, ·1 inch. *Bahia, Brazil.*

C. SOMERI, de Folin. Pl. 66, fig. 60.

Elongated, conical, smooth, whitish, almost opaque, aperture not contracted nor oblique, septum projecting, mamillate at the apex. Length, ·095 inch.

——— *Pernambuco, Brazil.*

Unfigured Species, and those of which the Figures are inaccessible to me.

C. CORNEUM, Dkr. *Brazil.*

C. ORCUTTI, Dall. *San Diego, California.*

C. DECURTATA, Monts. *Sicily.*

C. PARVULUM, C. MINUTUM, C. IMPERFECTUM. C. VALIDUM, C. COMPLANATUM, C. MASSILIENSE, C. MODESTUM, C. CARMENENSE (*I. Carmen*), C. CUCCINA (*Vera Cruz*), C. ORIENTALE (*I. Rhodes*), C. VERACRUZANUM (*Mexico*), C. STRIGOSUM (*Rio Janeiro*), C. BIMAMILLATUM (*La Guayra*), C. CIRCUMVOLUTUM (*Aspinwall*), C. SUBFLAVUM (*Cape York, Australia*), C. SUCCINEUM (*Cape York, Australia*), all of de Folin.

C. CORRUGATULUM, C. REVERSUM, and C. TERES, Carpenter. *Mazatlan.*

C. SUBQUADRATUM, Carp. *Port Elizabeth.*

C. BIMARGINATUM, Carp. *Singapore.*

C. ARMORICUM, Folin. *Gulf of Gascony.*

C. INCOMPTA, Monterosato (*C. glabrum*, Brusina). *Mediterranean.*

Section II. Annulata.

C. SUBIMPRESSUM, Carp. Pl. 66, fig. 61.

Rather solid, the annulations rounded, with subimpressed interstices, septum mucronate, mucro small, obtuse, dorsal; operculum concave. Length, ·115 inches.

Mazatlan to Cape St. Lucas, L. C.

C. FLORIDANUM, Stimpson. Pl. 66, fig. 62.

Arcuate, solid, white, shining, with about 32 acute, elevated annulations and much wider interstices, aperture a little oblique, not contracted, septum obtusely mucronate, mucro dorsal.

Florida.

C. PULCHELLUM, Stimpson. Pl. 66, fig. 63.

Somewhat solid, light brownish, adolescent stage graceful, with distant few annulations, adult with about 25 rounded annulations and more or less equal interstices, septum mamillate; operculum concave, with about 8 whorls. Length, ·1 inch.

New Bedford, Mass.

C. FIRMATUM, C. B. Ad. Pl. 67, fig. 66.

Stout, young shell smooth, adult with 23–33 annulations, the earlier ones more acute, then becoming subquadrate, interstices also subquadrate, narrow, septum subangulate, the projection short. Length, ·1 inch.

Panama, Mazatlan, Todas Santos Bay, L. C.

With this are to be united, according to Carpenter, *C. eburneum*, *C. diminutum* (jun.), *C. pygmæum* and *C. monstrosum* (both adolescent), of C. B. Adams.

C. QUADRATUM, Carp. Pl. 67, fig. 67.

Short, solid, with 12–20 quadrate annulations, and deep quadrate interstices, aperture subcontracted, septum mucronate, the mucro small, narrow, subdextral. Length, ·072 inch. *Mazatlan.*

Var. COMPACTUM, Carp. Pl. 67, fig. 68.

Annulations large, planate, interstices small or evanescent.

C. ELEGANTISSIMUM, Carp. Pl. 67, fig. 69.

Diaphanous, vitreous, shining, white, aperture slightly contracted and oblique, young shell smooth, adolescent and adult with 14 to 18 distant acute liræ, the interstices very elegantly arcuate; septum submucronate and subungulate, the small apex obtuse. Length, 1 inch. *Teneriffe.*

Var. SEARLES-WOODII, Carp.

Rings closer (about 24 in the young shell), scarcely sharp and often obsolete, growth scarcely tapering, very slender, septum ungulate, turned somewhat to the right.

C. UNDATUM, Carp. Pl. 67, fig. 70.

Short, obese, young shell smooth, adult with 10–15 acute annulations and undulating concave interstices, contracted at each extremity, septum ungulate, with prominent, acute, elongate apex; operculum concave, with about 15 whorls.

Panama to Mazatlan.

The adolescent stage is *C. parvum*, C. B. Ad. Folin has described Vars. *contraria* and *cornea*.

C. RYSSOTITUM, Folin. Pl. 66, fig. 64.

White, very shining, transversely obsoletely annulated, becoming more distinct on the concave side near the aperture, aperture oblique, much contracted above, septum submamillate, submucronate. Operculum? Length, ·09 inch.

West Indies, Venezuela, Brazil.

C. PARADOXUM, Folin. Pl. 67, fig. 78.

Shell arcuate, subtranslucent, yellowish white, grayish or corneous, smooth, with three prominent distant rounded annulations near the apex, and wider interspaces, septum large, with bead-like projection. Length, ·066 inch.

Pearl Islands, Panama.

C. SUBANNULATUM, de Folin. Pl. 67, fig. 72.

Hyaline, slightly arcuated, very finely numerously annulated, the septum convex, hardly projecting, aperture encircled by a prominent rib. Length, ·066 inch.

Mediterranean and Adriatic Seas.

C. CREBRICINCTUM, Carp. Pl. 67, fig. 71.

Rather large, solid, reddish brown, with darker longitudinal rays, often obsolete, with about 80 close, rounded, low annulations, without interstices; septum subungulate, submucronate. Length, ·14 inch.

Monterey, San Diego and Sta. Barbara, Cal.

C. CALIFORNICUM, Dall. Pl. 66, fig. 65.

Small, rather narrow, whitish or brownish, with 34–38, close acute annulations, and subconcave interstices, septum subungulate, apex obtuse, not elevated. Length, ·09 inch.

San Diego and Catalina Isl., California.

This is *C. Cooperi* of Carpenter, not Sanderson Smith.

C. TRACHEA, Montagu. Pl. 67, fig. 77.

Solid, brownish corneous, young shell smooth, adult with 40–50 close annulations, the interstices small, very minutely longitudinally striulate, septum subangulate, submucronate, apex somewhat to the right, obtuse, more or less elevated; operculum scarcely concave, with spiral elevated lines and about 15 whorls. Length, ·128 inch. *England to Mediterranean Sea.*

It is *Dentalium imperforatum*, Mont.; *Creseis rugulosa*, Cantraine; *Brochus trachiformis*, and *striatus*, Brown; *Cornuoides major*, Brown; *Odontidium rugulosum*, Phil. (in part); *C. obsoletum*, Carp. (unfigured), is described as a variety.

C. MAGNUM, Stearns. Pl. 67, fig. 83.

Very finely, closely annularly striate, septum with sharp narrow ungulate apex, yellowish brown. Length, ·2 inch.

San Diego, Cal.

On the label of this specimen it is said to = *C. glabriformis*, Carp. The latter is described as a much smaller species, one-third the length of the present, smooth, with hemispherical mucro.

Undetermined Species,

including those of which the figures are inaccessible to me.

C. ELONGATUM, C. CLATHRATUM, Carpenter. *Mazatlan.*

C. GRACILE, Carp. *Japan.*

C. REGULARE, Carp. *West Indies, Singapore.*

C. GURGULIO, Carp. *West Indies.*

C. GRACILE, Gould (name used by Carpenter). *China Sea.*

C. MICROCYCLOS and C. ATTENUATUM (*Cape York, Australia*); C. TORQUATUM and C. LINEICINCTUM (*West Indies*); C. ELEGANS and Vars. RUBELLA and FLEXUOSA, C. SUPERBUM, C. OCCULTUM, C. STRANGULATUM and Var. ACUTA, C. VENUSTUM, C. ERUCATUM, C. TÆNIATUM, C. AGONIATUM, C. BIPARTITUM, C. IMPARTITUM and Var. BICOLOR, C. SEMICINCTUM and Var. SUBACUTA, and C. EXILE (*Tongatabou*), all of de Folin.

Section III. Costulata.

C. CLAVA, de Folin. Pl. 67, fig. 86.

Shining, with subacutely rounded longitudinal costulations, becoming stronger towards the aperture, and evanescent annular striæ, inflated towards the aperture, aperture contracted, narrowly margined, septum mucronate, prominent, apex obtuse.

Length, ·08 inch.

Guadeloupe, W. I.

C. BREVE, de Folin. Pl. 67, fig. 88.

Very short, cylindrical, slightly bent, subpellucid, white, with fine longitudinal liræ, and equal interspaces and a few annular striæ towards the aperture, aperture encircled by a tumid rib, not contracted; septum mamillate, subungulate, with dextral apex. Length, ·05 inch.

Jamaica.

Undetermined Species.

C. SUBSPIRALE, ABNORMALE, INSCULPTUM, OBTUSUM, Carpenter. *Mazatlan.*

C. PLICATUM, Carpenter. *W. Indies.*

C. POLLICARE, Carpenter. *Teneriffe.*

C. LAQUEATUM, C. B. Ad. *Panama.*

C. SEMITRACHEA, Brusina. *Mediterranean.*

C. CRYSTALLINUM (*Honolulu*), C. STRIATUM, C. MIRABILE, Folin.

Section IV. Quadrilata.

C. ANNULATUM, Brown. Pl. 67, fig. 76.

Elongated, solid, with 20–30 rounded annulations, larger and more distant towards the mouth, and rather close longitudinal liræ, septum with a dextral finger-like mucro. Young shell with more acute annulations, the longitudinal sculpture obsolete.

Length, ·122 inch.

Europe, West Indies, Aden.

The more characteristic name of *reticulatum* was given to the adolescent form by Brown. It is *Orthocera trachea* of Fleming.

C. INSIGNE, Folin. Pl. 67, fig. 87.

Elongated, subdiaphanous, shining, brownish, with wide flatly rounded annulations and narrow interstices, longitudinally striate

over the annulations; aperture oblique, margined by a rib; septum mucronate, mucro dextral, sharp pointed.

Length, ·125 inch.

Jamaica.

C. CORONATUM, Folin. Pl. 67, fig. 80.

Yellowish gray, with wide, flatly rounded annulations and minute interstices, decussated by prominent, distant rounded longitudinal costæ, with rather wide interstices, aperture bordered by a tubercular rib; septum mucronate, mucro dextral, sharp pointed. Length, ·08 inch.

Jamaica.

C. IRREGULARE, Folin. Pl. 67, fig. 82.

Yellowish or grayish, with wide flattened annulations, becoming higher and more convex towards the aperture, interstices narrow, and longitudinally striate; septum mucronate, the mucro dextral, finger-like. Length, ·16 inch.

Bahia, Brazil.

C. PHRONIUM, Folin. Pl. 67, fig. 79.

Shell well-curved, with numerous rounded annulations, and narrow interstices, decussated by longitudinal distant narrow sulci; mucro spinose. Length, ·13 inch.

Haiti.

C. COOPERI, Smith. Pl. 67, figs. 84, 85.

Shell with about 24, somewhat rounded longitudinal ribs, crossed by numerous annulations, which are less marked towards the middle, white; septum mucronate, with the apex inclining to the left, when looking at the back of the shell; operculum concave. Length, ·13 inch.

New England, Long Island Sound.

Because of *C. Cooperi*, Carpenter, Dr. Cooper changed the name of this species to *C. Smithii* and Prof. Verrill to *C. costatum*, but as Smith's species was published before Carpenter's, both these names fall into the synonymy. It is a pity that such a little shell should be burthened with such a large synonymy—and for which there is no excuse. The desire to rush into print is so overmastering that no one is deterred by such a slight obstacle as being unable to refer to the literature of his subject. The figure given by Verrill represents the adolescent stage of sculpture, with less numerous ribs (fig. 85).

Undetermined Species.

C. LIRATOCINCTUM and C. HEPTAGONUM, Carp. *Mazatlan.*

Of the latter species Folin has described vars. *hexagonum* and *octogonum.*

C. IMBRICATUM, Carp. *West Indies.*

C. INFIMUM (*Aspinwall*), C. MIRIFICUM, C. UNCINATUM, Folin.

Section V. Armata.

C. SPINOSUM, Folin. (Description and figure inaccessible to me).

Undetermined Species of Cæcum.

I am unable to refer the following species to their appropriate sections:—

C. TRIORNATUM, C. ABBREVIATUM, C. INSTRUCTUM, C. CONTRACTUM, C. VESTITUM, of de Folin.

C. FASCIATUM, and var. INTAMINATA, de Folin. *Mediterranean.*

C. SYRIACUM, de Folin. *Tripoli, in Syria.*

C. VITREUM, and var. SUBORNATA, C. INCLINATUM, C. MARGINATUM, de Folin. *Cape Verde Is.*

C. VICINUM, C. CRASSUM, C. SENEGAMBIANUM, Folin. *W. Africa.*

C. FORMULOSUM, and vars. DECUSSATUM, MARMORATUM and SULCATUM, de Folin. *Bahamas.*

C. SEPIMENTUM, de Folin. *Sandwich Is.*

C. SEPIMENTUM, var. ARCUATUM, de Folin. *Tahiti.*

C. INFLATUM, C. VARIEGATUM, and var. MINIMA, de Folin. *Hong Kong.*

C. CHINENSE, de Folin. *China, Australia.*

Subgenus MEIOCERAS, Carpenter, 1858.

C. NITIDUM, Stimpson. Pl. 67, fig. 73.

Shell smooth, shining, whitish or light brown, inflated in the middle, contracted towards the aperture, aperture oblique, septum submucronate, the mucro convexly rounded; operculum concave, 5-whorled. Length, ·088 mill.

Florida, West Indies.

Carpenter describes a species under the name of *nitidum*, Bean MS., which appears to be identical.

C. CORNUCOPIÆ, Carpenter. Pl. 67, fig. 75.

Like the preceding, but smaller and less inflated, being subcylindrical; mucro very acute. Length, ·064–·09 inch.

West Indies, in sponge of commerce.

C. CORNUBOVIS, Carpenter. Pl. 67, fig. 74.

Shell like the preceding, but the septum subangulate, with narrow, submucronate apex; operculum about 12-whorled, with an exterior strong spiral lamina. Length, ·067–·082 inch.

West Indies.

Unfigured Species.

C. SUBINFLEXUM (*Bahamas*), C. FISCHERI and C. IMIKLIS (*Vera Cruz and Carmen*), C. CUBITATUM, C. TENERUM, C. COXI, C. UNDULOSUM, C. CROSSEI, C. DESHAYESII, C. MORELETI, C. BITUMIDUM, C. CARPENTERI and C. TUMIDISSIMUM, all of de Folin.

Subgenus STREBLOCERAS, Carpenter, 1858.

C. SUBANNULATUM, de Folin. *Honolulu.*

This is the only recent species of the group, and it is unfigured.

Subgenus WATSONIA, de Folin, 1879.

C. ELEGANS, de Folin. *Cape York, Australia.*

The only species, and unfigured.

Subgenus PARASTROPHIA, de Folin, 1869.

C. FOLINI, Bucq. Dautz. et Dollf. Pl. 67, fig. 81.

Shell elongated, rather narrow, thin, subopaque, white; nucleus smooth, oblique, afterwards finely annulated, the annulations microscopically decussated. Length, ·085 inch.

Mediterranean.

Spirolidium Mediterraneum, Costa, is identified with this species by Monterosato.

Undetermined Species.

C. ASTURIANA, de Folin. *Atlantic Coast of Spain.*

C. CHALLENGERI, de Folin. *Cape York, Australia.*

INDEX AND SYNONYMY.

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Family *EULIMIDÆ*.

Animal with slender, subulate tentacles and eyes sessile at their outer bases, proboscis retractile, invaginate, when extended very long, mouth without jaw or radula; foot elongated, produced in front, mantle with anterior rudimentary siphonal fold.

Shell small, generally elongated, subulate or turriculated, shining, polished, with spire usually curved or distorted; aperture oval, pyriform, entire, with simple lip, the columellar margin more or less thickened. Operculum corneous, paucispiral, sometimes absent.

This family, together with the Turbinellidæ and Pyramidellidæ which follow it in the present volume of monographs, constitutes the division Gymnoglossa of Gray, including proboscidiferous mollusks having no radula; the Solariidæ and Cancellariidæ, also originally included therein, have radulæ and are otherwise related more closely to different groups.

But little is known of the animals of these little shells; it is not certain, but probable that the sexes are separated. They creep with the foot much in advance of the head, which is usually concealed within the aperture of the shell, the tentacles only protruding. They are more or less parasitic on sea-urchins, holothurians, etc. The small size of the shells, absence of color in most of the groups, and of sculpture, make the discrimination of species somewhat difficult.

The Eulimidæ have been monographed by Arthur Adams, Thes. Conchyliorum, ii, 793–805. G. B. Sowerby, Reeve's Conchologia Iconica, xv, 78 species, 1866.

Synopsis of Genera.

Genus EULIMA, Risso, 1826.

Shell imperforate, subulate, many-whorled, polished, porcellanous, spire usually curved or twisted to one side, bearing on one side only, a series of varices forming ribs internally and marking the position of successive mouths, apex acute; aperture oval, entire, pointed above, rounded below, the lip simple, a little

thickened, columellar margin reflected. Operculum corneous, paucispiral, the nucleus near the inner lip.

Animal with subulate tentacles, approaching at the base, eyes large, nearly sessile, foot truncated in front, mentum bilobed, opercular lobe winged on each side, branchial plume single.

Over fifty species have been described, from tropical and temperate seas. The genus appeared early in the secondary and became abundant in forms during the Tertiary period.

The foot of Eulima secretes a mucous filament which assists to sustain it in the water. The parasitism of several species has been observed. *E. distorta* lives in the interior of *Holothuria intestinalis* upon the coast of Norway; several species have been captured in the intestines of Holothurians at the Philippine Islands, and one of them insinuates itself so deeply in the integuments of the Holothuria that only the summit of its spire remains exposed; at New Caledonia they have been observed attached to Asteriæ.

The synonyms are *Pasithea*, Lea (in part), 1833, and *Balcis*, Leach, 1847. Monterosato has proposed two sections *Vitreolina* and *Acicularia*, for some of the Mediterranean species. The first contains the small vitreous species without internal varices, with curved spire and slightly obtuse apex; the second has the apex acute, the shell white, the internal varices occasional.

Subgenus Subularia, Monterosato, 1884.

Shell subulately turriculated; whorls a little flattened on the side, smooth, polished, often ornamented with spiral colored bands, a succession of slight varices on *each* side of the spire, not always apparent; aperture oblong, narrow, entire; inner lip thickened, a little sinuous in the middle, outer lip sharp, flexuous.

I reluctantly use the above name in preference to the better known one of *Leiostraca*, H. and A. Adams, 1853, on account of *Liostracus*, Albers, 1850.

Section Haliella, Monterosato, 1878. Animal blind.

Subgenus Bacula, H. and A. Adams, 1863.

Differs from *Eulima* in having spiral striæ, and the columella twisted back so as to form an acute angle at the base of the aperture. *Arcuella*, Nevill, 1874, is a synonym.

Subgenus APICALIA, A. Adams, 1862.

Shell solid, spire twisted with decidedly mucronated apex, aperture oblong.

Subgenus MUCRONALIA, A. Adams, 1862.

Shell subulate, straight, often colored, pupoidal, with mucronate apex; aperture oval-oblong.

The distinction between this group and *Apicalia* is a very slight one.

Subgenus SELMA, A. Adams, 1864.

Shell oblong-ovate, subdiaphanous; spire short; last whorl large; aperture elongately ovate; columella arcuate, obliquely subplicate.

Subgenus STYLIFERINA, A. Adams, 1860.

Shell oval-conic, diaphanous, thin, smooth; whorls numerous; apex mucronate, nucleus sinistral; aperture subquadrangular. Parasitic on Asteria and Ophiura.

Subgenus LAMBERTIA, Souverbie, 1869.

Shell pupiform, white, very smooth, polished; spire mucronate, cylindrical, the summit mamillated; whorls few; aperture semilunar, peristome continuous; the outer lip sharp, the inner lip a little reflected at the base, columella slightly twisted. Operculum unknown.

Subgenus AMAURELLA, A. Adams, 1867.

Shell small, oval, imperforate, white, shining, summit mamillated; lip and columella thick.

Resembles *Macrocheilus* in miniature, and is, perhaps, more nearly related to *Stylifer*.

Subgenus EULIMOPSIS, Brugnone, 1880.

A fossil group; the base concentrically striate, whorls scarcely convex, suture distinct, aperture subrhomboidal, lip sinuous, columella twisted, base subchanneled.

E. CARMELÆ, Brugn. Pliocene, *Sicily*. (Struct. and Syst. Conch., ii, t. 68, f. 84.)

Subgenus IOPSIS, Gabb., 1873.

Shell very small, smooth, polished, spire elevated, suture nearly obsolete, columella slightly twisted, forming an imperfect

basal channel. E. FUSIFORMIS, Gabb. Tertiary, *West Indies.* (Struct. and Syst. Conch., ii, t. 68, f. 86.)

Genus SCALENOSTOMA, Desh., 1863.

Imperforate, turriculated, surface not enameled, suture margined; whorls numerous, the last with carinated periphery; aperture subtrigonal, entire, a little arcuated, columella simple, rectilinear, forming an angle at its junction with the lip, lip obliquely, deeply notched near the suture.

Isle of Bourbon.

Subgenus SUBEULIMA, Souverbie, 1875.

Shell much twisted, not enameled, whorls margined at the suture and with a series of varices on the right side, as in *Eulima*, last whorl with carinated periphery, but the lip without superior sinus.

New Caledonia.

Genus NISO, Risso, 1826.

Shell deeply umbilicated, turriculated, many whorled, polished, apex acute; whorls slightly convex, the last with angulated periphery, aperture angulated above and below. Operculum as in *Eulima.*

China, Philippines, W. America.

Bonellia, Desh., 1838, and *Janella*, Grat., 1838, are synonyms.

Section VOLUSIA, A. Adams, 1861.

Shell longitudinally ribbed.

Section PALÆONISO, Gemmellaro, 1878.

Shell thicker, more dilated at the base, more pupoidal in form, lip with a slight posterior sinus. Secondary. *N. pupoides*, Gemm. Lias.

Genus HOPLOPTERON, Fischer, 1876.

Shell very small, imperforate, elongate-turreted, shining, with obtuse summit; suture linear; whorls continuous, the earlier ones smooth, rather flattened, the others bearing on each side a long, triangular, wing-like varix; aperture rounded oval, entire, lip simple, sharp.

China.

The minuteness of this shell and its bizarre appearance suggest that it is embryonic. It is only 1·15 mill. long.

Genus STYLIFER, Broderip, 1832.

Imperforate, hyaline, thin, ovoid or elongated, smooth, polished; whorls numerous, apex very sharp, sometimes bent, nucleus sinistral, last whorl globular; aperture suboval, inner lip smooth, arcuated, outer lip slightly sinuous, thin, simple. No operculum.

Body ciliated; tentacles slender, subulate, with eyes sessile at their outer bases; mantle reflected upon and more or less surrounding the shell, forming a siphonal lobe on the right side; foot linguiform, narrow, tubular in front, where it extends much beyond the head, attenuated behind, with a median groove below; verge sharp, elongated, resembling a tentacle.

About twenty species are known from warm seas.

Stylina, Fleming, 1828 (Gray), is a synonym.

Stylifer is commensal or parasitic in its habits, occurring on Echinoderms; some are found in the teguments of Asteriæ, others on the upper face of the shells of Echini, between the spines, and generally near the anal opening; *S. Orbignyanus* lodges itself in a spine of Cidaris, which becomes deformed in growth, forming an interior cell containing a pair of Stylifers and some young ones, the cell having a small mouth on either side; other species are obtained from Holothurians, Comatulæ, etc.

The species mentioned above, inhabiting the spines of Cidaris, appears to be viviparous, but *S. Turtoni*, on the contrary, is oviparous. Those which live upon the external surface of their host are probably commensal rather than truly parasitic.

How does the *S. Orbignyanus* obtain nourishment?

Subgenus CYTHNIA, Carpenter, 1864.

Imbedded in star fishes like *Stylifer*, from which it is distinguished by its normal nuclear whorls, and thin concentric operculum. *W. Coast of N. America.*

Subgenus PLICIFER, H. Adams, 1868.

Imperforate, ovately subulate, not shining; spire styliform, nucleus sinistral, columella plicate; lip flexuous, sinuate behind, aperture entire in front. Found on coral, at Ceylon; the shell resembles *Leptoconchus* in texture.

[Genus ENTOCONCHA, J. Müller, 1852.

Shell obovate, smooth; spire short, very obtuse, apex not elevated, whorls rapidly increasing; aperture transverse, semilunar, angulated above, rounded below, width almost equaling the height, margins disunited, the columellar margin straight. Operculum non-spiral.—E. MIRABILIS, Müller.

Found parasitic in *Sinapta digitata*, one of the Holothuriidæ, at Trieste. A larval mollusk, sometimes referred to the present group, but now placed, doubtfully, with the Nudibranchiata].

Genus EUCHRYSALIS, Laube, 1866.

Small, thin, pupoid, attenuated at its extremities; whorls numerous, short, smooth, suture shallow; aperture long, narrow, the lip sharp and thin, columella terminated by an indication of a siphon. Silurian—Cretaceous; *Europe*, *India*.

Subgenus MITCHELLIA, de Koninck, 1877.

Shell elongated, cylindrical-conic, many whorled; aperture long, extremely narrow, sinuous, attenuated at its extremities, rostrated and prolonged but not canaliculated in front; peristome continuous, the lips subparallel, outer lip reflected; surface spirally striated. Devonian, *Australia*. The type is sinistral.

Genus MACROCHEILUS, Phillips, 1841.

Shell thick, imperforate, ventricose, aperture effuse below, outer lip thin, columella callous, slightly tortuous and plicate in front.

Devonian—Carboniferous. M. SCHLOTHEIMII, d'Arch. (Struct. and Syst. Conch., t. 68, f. 91).

The synonymy includes *Polyphemopsis*, Portlock; *Plectostylus*, Conrad; *Macrochilina* and *Duncania*, Bayle, 1879.

Subgenus PASITHEA, Lea (Restricted), 1833.

Spire short, last whorl ventricose. Rather more slender and cylindrical than the typical *Macrocheilus*. M. CLAIBORNENSIS, Lea. Eocene; *Alabama*.

Genus BOURGUETIA, Desh., 1871.

Shell large, turreted; spire long, pointed; whorls convex, spirally striated or grooved, last whorl large; mouth oval, angular behind, widened and rounded below. B. STRIATA, Sowb., Jurassic.

Genus LOXONEMA, Phillips, 1841.

Shell elongated, many-whorled; aperture simple, attenuated above, effused below, with a sigmoidal edge to the outer lip; spire interiorly septate.

Like many other palæozoic genera, the bad condition of many of the species and the variation in form and sculpture render it difficult to place it properly in a systematic work; some of the species might go into Turbonillidæ, others appear closely allied to *Chemnitzia*, and might even be synonymous with it. *Michelia*, Römer, and *Holopella*, Sandberger (in part), are synonyms. L. COSTATUM, Sandb. (Struct. and Syst. Conch., t. 68, f. 97).

Genus STROBEUS, de Koninck, 1881.

Shell small, smooth, spire sharp, of 5–7 convex whorls; mouth long-oval, outer lip sharp, inner lip callous, with an anterior fold. Dist. 3 sp. Carboniferous, *Belgium*.

Genus ORTHONEMA, Meek and Worthen, 1861.

Shell elongate, many-whorled, with revolving carinæ, crossed by nearly straight growth-lines; aperture angular above, slightly effuse below, lip simple, nearly straight; axis imperforate.

Devonian and Carboniferous, *United States*.

Allied to *Loxonema*, but has distinct revolving carinæ, and wants the sigmoid outer lip of that genus.

Genus RIGAUXIA, Cossmann, 1885.

Shell narrowly elongated, nearly cylindrical, spirally striate; aperture rounded in front, lip a little sinuous above, inner lip thickened behind and separated from the columella in front by a groove. Fossil, Bathonian.

Genus CLIMACINA, Gemmellaro, 1878.

Shell imperforate, many-whorled, elongated, very finely longitudinally striated; aperture oval, rounded in front, lip simple. C. CATHERINÆ, Gemm. Lias.

Genus SUBULITES, Conrad, 1842.

Shell fusiform, spire produced; volutions convex, the last large; columella bent and truncated at the base, where it is separated from the outer lip by a notch as in *Achatina;* outer

lip very slightly notched near the upper end; surface of shell smooth. Palæozoic, *United States.*

Bulimella, of Hall (not Pfeiffer); *Bulimorpha*, Whitfield, 1882, and *Polyphemopsis*, Portlock (in part), are synonyms.

Genus FUSISPIRA, Hall, 1872.

This Silurian group, which I have placed in Buccinidæ, may possibly belong here.

F. VENTRICOSA, Hall (Struct. and Syst. Conch., ii, 141, t. 51, f. 50).

Genus CHEMNITZIA, d'Orb., 1850.

Shell comparatively large, elongate conical; spire many-whorled, the last rather large, somewhat produced below; aperture ovate, somewhat effuse at base, peristome not continuous, outer lip sharp, sinuous at or above the middle, columella smooth, imperforate; surface longitudinally striate or costate, sometimes decussated, rarely nodular. Secondary and Tertiary. C. CONDENSATA, Desh. (Struct. and Syst. Conch., ii, t. 68, f. 96).

The recent shells known as *Chemnitzia*, and which were originally included by d'Orbigny in his diagnosis of 1839, are referred to *Turbonilla*, Risso; they are smaller, ribbed, and do not possess the broad posterior lip-sinus of the fossil group.

Section CHEMNITZIA (restricted).

Shell lengthened, with cross ribs; mouth oval, rounded or angular in front; spire straight or slightly curved, somewhat callous; outer lip sharp.

Section RHABDOCONCHA, Gemellaro, 1878.

Whorls striate or ribbed longitudinally, sometimes punctate or tuberculate.

Section PSEUDOMELANIA, Pictet et Campiche, 1862.

Shell elongated, thick; whorls smooth, with fine curved growth-lines; mouth rounded or angular in front; spire straight or slightly curved.

Section OONIA, Gemellaro, 1878.

Shell egg-shaped, smooth, with growth-lines; last whorl large; mouth oval, rounded in front; spire slightly curved.

Section MICROSCHIZA, Gemellaro, 1878.

Shell usually with cross ribs; narrowly perforate; whorls

sharp, mostly scalariform; mouth oval, rounded in front; inner lip and spire callously thickened.

Section Bayania, Munies-Chalmas, 1877.

Shell elongated, spire sharp, earlier whorls reticulated, the last generally smooth, or feebly sculptured, basal lip subsinuous. About twenty Eocene and Miocene species.

Genus EULIMA, Risso, 1826.

Section Eulima (*sensu stricto*).

E. grandis, A. Ad. Pl. 68, fig. 89.

Solid, opaque; whorls 15, rather flat, with lateral continuous varices, last whorl angulated on the periphery. Length, 40 mill.

Island of Burias, Philippines.

E. Martinii, A. Ad. Pl. 68, fig. 90.

Whorls numerous, flattened, with varices obliquely impressed, obliquely continuous to the apex, last whorl rather angular on the periphery. Length, 35 mill.

China Sea; Singapore.

Reeve gives *St. Helena* as locality, which requires confirmation.

E. candida, Marrat. Pl. 68, figs. 91, 92.

Whorls numerous, short, somewhat rounded, the varices impressed forming a continuous oblique line not reaching the apex. Length, 44 mill.

Formosa.

A stouter species than the preceding, with shorter whorls, not angulated on the periphery; the varix-line does not extend to the apex.

E. major, Sowb. Pl. 68, figs. 93, 94.

Spire more or less curved to the right, often with a sutural band, very highly polished, white, sometimes blotched or clouded with chestnut or bluish chocolate, varix-line impressed, continuous. Length, 37 mill.

Tahiti, Sandwich Is., Mauritius.

E. arcuata, Sowb. (fig. 94), is a much curved specimen; intermediate degrees of curvature are before me. *Phasianella inflexa*, Blainv., is possibly this species.

E. FLEXUOSA, A. Ad. Pl. 68, fig. 95.

Whorls 15, flattened, with a semitransparent sutural line, the last whorl rounded, aperture broadly oval, outer lip flexuously produced in the middle. Length, 31 mill.

Hab.?

Very close to the preceding species, but the aperture is more rounded, and the spire is slightly curved to the left above.

E. PICTA, Sowb. Pl. 68, fig. 98.

Solid, pyramidal; whorls 11, slightly convex, those near the apex white, the last very obtusely angular, painted above the angle with an obscure interrupted rose-colored band.

Length, 1 inch.

Habitat unknown

E. CUMINGII, A. Ad. Pl. 68, fig. 96.

Whorls 13, a little rounded, spire nearly straight, varices irregular, impressed, here and there not apparent.

Length, 35 mill.

Sandwich, Lord Hood's and Viti Islands.

E. TEINOSTOMA, A. Ad. Pl. 68, fig. 97.

Spire straight; whorls 12, rather flat, with an impressed line beneath the suture, somewhat pellucid, last whorl rounded, aperture narrow. Length, 1 inch.

Viti Is. on coral reefs.

Too close to the preceding species; appears to be narrower.

E. LACTEA, A. Ad. Pl. 68, fig. 99.

Opaque, solid, nearly straight; whorls rather flat, the last subangulate on the periphery, varices impressed, continuous.

Length, 28 mill.

Philippines.

E. BREVIS, Sowb. Pl. 68, figs. 1, 2.

Short; whorls convex, spire acuminated, the apex a little turned to the left, hyaline, whitish or pale fawn color.

Length, 9–19 mill.

Pacific Ocean, on shells of the Pearl Oyster; *Isle Annaa.*

I am unable to separate *E. labiosa*, Sowb. (fig. 2), from this species.

E. PORCELLANA, A. Ad. Pl. 68, figs. 100, 15.

White, opaque, solid, long, narrowly subcylindrical, apex slightly curved; whorls flat, the periphery subangulated, varices irregular, conspicuous. Length, 1 inch.

Hab. unknown.

E. ACUTA, A. Ad. Pl. 68, fig. 3.

Subulate, white, opaque, nearly straight; whorls flat, body-whorl long, not angulated, aperture oblong, rather turned backwards in front, outer lip thin, not much curved. Length, 1 inch.

Isl. of Luzon, Philippines.

Figured in Conch. Icon. as *acuta*, Sowb., but that is a much smaller species, from *W. Coast of Central America*, and referred to *Leiostraca*, by Carpenter.

E. SOLIDA, Sowb. Pl. 68, figs. 5, 4.

Solid, subulate, curved, distorted, white, suture margined, last whorl swollen, somewhat produced obliquely, spire attenuated. Length, 10 mill.

Paumotus, Viti Is., Sandwich Is.

E. inflexa, Pease (fig. 4) is a synonym.

E. PUSILLA, Sowb. Pl. 68, figs. 6, 7.

Solid, subcylindrical, acuminated, narrow, white; whorls rather flat, the last oblong, aperture narrow. Length, 10 mill.

Viti Is., St. Helena?

I have from two respectable sources *Stylifer acicula*, Gould, under this name, and as that species has the same outline, it is difficult to decide which is the proper identification of *pusilla*. In making my selection, as above, I am compelled to make *E. exilis*, Pease (fig. 7), a synonym.

E. VENUSTA, Pease. Pl. 68, fig. 8.

Rather solid, vitreous, ashy white, elongate, subulate, very narrow, spire very slightly twisted; whorls 9–10, flatly convex, distinctly margined at the suture. Length, 6 mill.

Tahiti.

Occurs associated with *Stylifer acicula*, Gld., but is smaller, more solid and slender, the spire more curved.

E. RETRORSA, Sowb. Pl. 68, fig. 9.

Solid, white, tinged with pale fawn color above, narrow, the apex recurved; whorls flat, rather straight, aperture small, oval-oblong, outer lip thickened, nearly straight. Length, 11 mill.

Tahiti.

Differs from *E. pusilla* only in the slightly recurved apex.

E. AUGUR, Angas. Pl. 68, fig. 10.

Rather narrow, white, opaque, solid, apex very slightly curved to the left; whorls 10, rather flattened, suture margined, periphery rounded. Length, 12 mill.

St. Vincent's Gulf, So. Australia.

E. PROXIMA, Sowb. Pl. 68, fig. 11.

Solid, white, opaque, arched backwards; whorls 11, flat, the last obscurely angular, suture faintly margined. Length, 15 mill.

Port Jackson, Australia.

E. ARTICULATA, Sowb. Pl. 68, fig. 12.

Acuminately pyramidal, white, articulated and marbled with chestnut; whorls rather rounded, varices somewhat prominent; outer lip thickened. Length, 23 mill.

Australia.

Scarcely looks like an *Eulima*, but the varices indicate its position here.

E. TENISON, Tryon. Pl. 68, fig. 16.

Obtusely turreted, slightly curved, translucid, whitish; whorls 7, flattened above, penultimate rounded, last subinflated, aperture pyriform, the outer lip thin, produced, inner lip reflected.

Length, 3 mill.

Tasmania.

The name is substituted for *E. micans*, Tenison-Woods, pre-occupied by Carpenter.

E. CONOIDALIS, Sowb. Pl. 68, fig. 17.

Shell pyramidal, rather broad below, solid, white, opaque; whorls flat, periphery angulated, varices irregular.

Length, 16 mill.

Sandwich Is. (Sowerby); *Singapore* (S. Archer!)

E. POLYGYRA, A. Ad. Pl. 68, fig. 18.

Pyramidal, straight, narrow, angular at the base, white, opaque; whorls numerous, short, flat, aperture obliquely diamond shaped, small, produced at base. Length, 10 mill.

Isl. Mindanao, Philippines.

E. CONICA, Sowb. Pl. 68, fig. 19.

Small, white, solid, pyramidal, rather straight; whorls short, flat, the last angulated, apex sharp, suture distinct, aperture obliquely subquadrangular, outer lip thick, columella rather tortuous. Length, 5 mill.

Hab. unknown.

Differs from the preceding species in the lower part of the aperture being acuminated; it is also more solid, and the whorls are not quite so short.

E. MODICELLA, A. Ad. Pl. 68, fig. 20.

White, semipellucid; whorls 11, flattened, varices continuous, last whorl slightly angulated in the middle; aperture oval, outer lip anteriorly produced. Length, 6 mill.

Isl. Zebu, Philippines.

Appears to be too closely allied to *E. retrorsa*, Sowb.

E. OPACA, Sowb. Pl. 68, fig. 13.

Rather straight, subulate, white, opaque, solid; whorls a little convex, the last oval; aperture ovate, outer lip thick, nearly straight. Length, 12 mill.

Sandwich Islands (Sowerby).

Somewhat stouter than *E. pusilla*, Sowb.

E. PYRAMIDALIS, A. Ad. Pl. 68, fig. 14.

Shell rather short and stout, nearly straight, white, subpellucid; whorls 10, scarcely convex, the last rounded; aperture small, rather rounded, laterally produced, outer lip thin, produced below the middle. Length, 9 mill.

I. Capul, Philippines (Cuming!); *Singapore* (S. Archer!)

E. CUSPIDATA, Reeve. Pl. 68, fig. 22.

Subulate, subventricose, spire straight, apex acuminated; whorls a little convex, the last oval, varices inconspicuous.

Length, 12 mill.

Isl. Zebu, Philippines.

E. TORTUOSA, Ads. and Reeve. Pl. 68, fig. 23.

Shell solid, white, narrow, tortuous in the middle and at the apex; whorls rather flat, obliquely varicose, aperture small, oval. Length, 20 mill.

China Sea.

E. SOLIDULA, Ads. and Reeve. Pl. 68, fig. 21.

Abbreviately turreted (apex lost), somewhat solid, tortuous, varicose; whorls 9–10, convex; aperture small; white. Length, 9 mill.

China Sea.

E. NITIDULA, A. Ad. Pl. 68, fig. 24.

Shell white, opaque, rather ventricose, straight; whorls 10-11, somewhat convex, the last not angulate; aperture oval, outer lip slightly curved inwards above. Length, 9 mill.

Singapore.

Mistaking this name for *nitida*, which is preoccupied, Sowerby changed it to *E. Adamsi.*

E. SUBANGULATA, Sowb. Pl. 68, fig. 27.

Pyramidal, thin, banded here and there with pale yellowish brown blotches; whorls flat, the last slightly angulated. Length, 20 mill.

Indian Ocean.

Closely allied to *E. hastata*, Sowb., from west coast of Central America, but narrower.

E. ACUFORMIS, Nevill. Pl, 68, fig. 28.

Very narrowly elongated, sharp pointed, flexuous, solid, white; whorls 17, cylindrical, varices obliquely continuous, last whorl rounded. Length, 10 mill.

Andaman Islands.

E. ROBUSTA, A. Ad. Pl. 68, fig. 25.

Pyramidally subulate, flexuous, apex recurved; whorls a little convex, the last large, oblique, rounded at the base, suture margined; aperture ovate, produced, inner lip thickened above, outer lip arcuate; white, semiopaque. Length, 4·5 mill,

Japan.

Figured from an author's specimen in the museum of the Philadelphia Academy.

E. MUNDULA, A. Ad. Pl. 68, fig. 26.

Subulate, twisted, spire laterally curved; whorls 9, a little convex, the last large, oblique at base; aperture ovate, produced; inner lip thickened, outer lip arcuate, scarcely inflexed; white, subopaque. Length, 3 mill.

Japan.

Figured from an author's type.

E. MICANS, Carp. Pl. 69, figs. 29, 30.

Straight, white, semipellucid, shining; whorls flattened, the last oblong oval; aperture narrowly oval, outer lip somewhat straight and scarcely thickened. Length, 9 mill.

San Diego, Cal.

I think that *E. Elodia*, Folin (fig. 30), from pearl oysters, West Coast of Central America, is synonymous. The figure is greatly magnified.

E. GRACILLIMA, Sowb. Pl. 69, fig. 31.

Very narrow, tortuous, solid, opaque, shining; whorls numerous, the last oblong, aperture narrow, laterally produced, outer lip rather thick, straight. Length, 12 mill.

Guatemala.

E. PARVA, Sowb. Pl. 69, figs. 32, 33.

Very minute, white, rather pellucid, arched in the middle; apex distorted, last whorl ovate, aperture oval. Length, 3 mill.

Mazatlan.

E. adamantina, Folin (fig. 33), from Meleagrinæ, West Coast of Central America, is a species only 2·5 mill. long and of similar form; it is very probably identical.

E. SUBROSTRATA, Sowb. Pl. 69, fig. 34.

Small, white, narrow, tapering, near the apex arched and attenuated; whorls few, the last oblong and slightly angular; aperture oblong, acuminated beneath, columella rather straight, outer lip thin. Length, 5·5 mill.

Hab. unknown.

E. GIBBA, Folin. Pl. 69, fig. 35.

Ventricose, spire acuminating and much curved, the apex somewhat obtuse, crystalline, very shining; whorls 9, somewhat convex, the last large, tumidly inflated. Length, 3 mill.

W. Coast of Centr. America, on Meleagrina.

E. OPALINA, Folin. Pl. 69, fig. 37.

Rather pyramidal, straight, opaque, opaline, streaked with chestnut, spire subacute; whorls 10, slowly increasing, a little convex, the last obtusely angulated in the middle, base contracted, aperture subquadrangularly oblique. Length, 3·5 mill.

W. Coast Central America, on Meleagrina.

E. PROCA, Folin. Pl. 69, fig. 38.

Elongate acuminate, whitish, blotched and triangularly clouded with flesh-color, especially below the sutural band; whorls 10–11, somewhat rounded, body-whorl rather long. Length, 3·3 mill.

W. Coast Central America, on Meleagrina.

E. HASTATA, Sowb. Pl. 69, fig. 39.

Rather straight, pyramidal; whorls somewhat flattened, the last with angulated periphery; rosy, brownish above the middle. Length, 22 mill.

St. Elena, W. Coast of Central America.

E. OLEACEA, Kurtz and Stimpson. Pl. 69, fig. 36.

Subulate, solid, straight or but slightly curved; whorls 12, flattened, closely coiled, suture inconspicuous; white, the spire-whorls marked in a banded manner with pale brown. Length, 6·25 mill.

New England—North Carolina.

Animal white, hyaline, its eyes visible through the shell.

E. CONOIDEA, Kurtz and Stimpson. Pl. 69, fig. 40.

Conic lanceolate, white, with 13 flat whorls, the last subangulate, aperture rhomboidal. Length, 9 mill.

North Carolina to Florida.

Figured from a specimen which is believed to be correctly identified.

E. JAMAICENSIS, C. B. Ad. Pl. 69, fig. 41.

Whorls about 10, a little convex, spire nearly straight, suture well marked, body-whorl long, rounded, aperture rather narrow. Length, 6 mill.

West Indies.

E. SUBCARINATA, d'Orb. Pl. 69, fig. 44.

Pyramidal; whorls 8, flat, last one obtusely carinated, suture narrowly margined. Length, 3·5 mill. *West Indies.*

E. IOTA, C. B. Ad. Pl. 69, fig. 42.

Very small, conical, white; whorls few, flat, the last wide and angulated on the periphery; apex acuminated and a little curved; aperture subrhomboidal; outer lip sharp; columella perpendicular. Length, 2 mill.

Jamaica.

Evidently a young shell.

E. INTERMEDIA, Cantraine. Pl. 69, fig. 43.

Rather solid, very smooth, semipellucid, white tinged with light chestnut, narrow; whorls 13, flattened; spire subulate; apex acute; body-whorl long, a little tumid, about one-third the length of the shell; aperture narrow. Length, 7·5 mill.

Norway to Mediterranean, Canary Is., N. England to Florida.

Is *E. nitida*, Phil. (not Lamarck.)

E. POLITA, Linn. Pl. 69, figs. 45, 46.

Pyramidal, acuminated, straight, or a little curved, solid, opaque, very shining, white, more or less tinged with fawn or flesh color; whorls about 10, a little convex, nearly flat, narrow, last whorl obsoletely angulated; aperture small, rather narrow.

Length, 17 mill.

Europe.

It is *Melania Bosci*, Payr.; *E. anglica*, Sowb.; *E. elegantissima* and *E. glaberrima*, Risso; *Melania Gervillei*, Collard; *Turbo albus*, Donovan.

Var. INFLEXA, Monts.

Spire slightly curved.

Var BREVIS, Requien. Fig. 46.

Shorter, more conical, periphery obtusely angulated.

? *E. Petitiana*, Brusina and *E. minor*, Monts., are synonyms.

E. INCURVA, Renieri. Pl. 69, figs. 48, 47, 51.

Thin, diaphanous; spire aciculate, composed of 10 nearly flat whorls; flexuous, body-whorl long, attenuated below.

Length, 2·8 mill.

Europe.

The following are synonyms: *E. distorta*, Phil., et auct., non Defrance (which is a fossil of the Paris basin, and a different

species), *E. Philippii*, Weink. (not Rayn. and Ponzi), *E. curvata*, Chiereg., *E. sinuosa*, Scacchi.

Var. GRACILIS, Forbes and Hanby. Fig. 47.

Larger and scarcely curved. *England.*

Monterosato has added vars., *ore-rotundato*, *ore-angusto*, *devians* and *exilis*, the latter subsequently made a species under the name of *antiflexa* (fig. 51). The figure, which is cited with doubt by Monterosato, is from Sars, and purports to represent *E. distorta*.

E. CURVA, Jeffreys. Pl. 69, figs. 49, 50.

Spire elevated, composed of 8 or 9 strongly curved, slightly convex whorls, suture superficial; hyaline white, translucent.

Length, 3·4 mill.

Mediterranean Sea.

Var. ELONGATA, B. D. and D. Fig. 50.

More elongated, the last whorls narrower.

E. COMPACTILIS, Monts. Pl. 69, fig. 52.

Slender, rather thick, semitransparent, whitish; whorls 7, the last one half the total length, suture inconspicuous, aperture narrow. Length, 3·75 mill.

Bay of Biscay to Azores, Mediterranean.

It is *E. obtusa*, Jeffreys (figured).

E. STALIOI, Brusina. Pl. 69, fig. 53.

Slightly curved; whorls 9, flattened, compact, apex rather obtuse, body-whorl rounded, aperture small, oblique.

Length, 4 mill.

Dalmatia to Madeira.

E. Petitiana, Brusina, which I have made a synonym of *E. polita*, var. *brevis*, is referred to this species by Jeffreys.

E. ABBREVIATA, Jeffreys. Pl. 69, fig. 56.

Conical, thin, semitransparent, glossy, minutely striate, ivory white, three apical whorls light brown, apex rather blunt; whorls 7, a little convex, the last long, rounded; outer lip straight.

Length, 3·75 mill.

Atlantic Ocean (Porcupine Exped.).

E. PYRIFORMIS, Brugnone. Pl. 69, fig. 54.

Pyriform; whorls 9, slightly convex, apex rather acute, body-whorl obtusely subangulated, large, outer lip nearly straight, white, apical whorls sometimes brown-tinted. Length, 6 mill.

Bay of Biscay to West Coast of Africa, Mediterranean.

Some specimens are more or less curved. Described as a fossil. According to Dr. Jeffreys *E. chaunax* and perhaps *E. hians* of Watson are synonyms. The characters are the swollen shape of the last whorl, the remarkably flexuous character of the outer lip, and acuminated apex.

Var. BIZONATA, with two narrow chestnut bands, one below the suture the other at the periphery, both showing on the spire-whorls.

E. FUSCO-APICATA, Jeffreys. Pl. 69, fig. 55.

Slender, thin, transparent, very glossy, microscopically striate, periphery sometimes slightly keeled, vitreous, the apical whorls chestnut brown; whorls 9–11, narrow, rather convex, outer lip remarkably flexuous. Length, 5 mill.

Bay of Biscay to Cape Verd Is.

E. JEFFREYSII, Tryon. Pl. 69, fig. 59.

Very slender, thick, transparent, very glossy, periphery more or less distinctly keeled, apex obtuse, glassy white; whorls 8, compact and flattened, the last about two-fifths the total length; mouth rather small. Length, 5 mill.

Bay of Biscay to W. Coast of Africa, Azores.

Described by Jeffreys as *E. solida*, a name preoccupied by Sowerby.

E. SUBUMBILICATA, Jeffreys. Pl. 69, fig. 57.

Short conical, solid, apex obtuse, nearly opaque, white, periphery obtusely angular; whorls 5, compressed and somewhat rounded, the last two-thirds the total length; umbilicus shallow, with a small perforation behind the pillar. Length, 1·25 mill.

Atlantic Ocean.

Probably a young shell.

E. MINUTA, Jeffreys. Pl. 69, fig. 60.

Club-shaped, thin, semitransparent and glossy, whitish, periphery rounded, apex blunt; whorls 5–6, the last about half the

total length; mouth oval, pointed above, outer lip somewhat thickened. Length, 2 mill.

Strait of Messina; Morocco.

E. GLABRA, Jeffreys. Pl. 69, fig. 61.

Awl-shaped, solid, semitransparent, polished, whitish, tinged with brownish yellow, apex blunt, periphery rounded; whorls 8, flatly convex, the last half the total length. Length, 3·75 mill.

W. Coast of Africa.

E. ACUTALIS, Jeffreys. Pl. 69, fig. 62.

Thin, semitransparent, periphery keeled, white, apex sharp; whorls slightly convex; aperture a little pointed below.

Length, 1·25 mill.

Mediterranean.

E. PERMINIMA, Jeffreys. Pl. 69, fig. 63.

Slender, rather solid, semitransparent, white, slightly tinged with yellowish brown on the body-whorl, apex bluntly pointed; whorls 6–7, compressed and compact. Length, 1·25 mill.

Zetland, Mediterranean.

E. GENTILOMIANA, Issel. Pl. 69, fig. 64.

Subulate, very slightly curved, white; whorls 11, flattened, suture margined, periphery rounded, apex acute.

Length, 4 mill.

Red Sea.

E. PAIVENSIS, Watson. Pl. 69, fig. 58.

Solid, whorls 7–8; a little rounded, suture slightly margined; transparent white, obsoletely stained with rust color, forming indistinct bands. Length, 4 mill.

Madeira.

E. DENTIENS, Dunker. Pl. 70, fig. 1.

Thick, white, very shining; whorls 6–7, a little convex, the last half the total length; lip thickened, dilated, obsoletely minutely tridentate within, at the base. Length, 8 mill.

Viti Islands.

Unfigured and Undetermined Species.

E. AFFINIS, E. CONICA, E. GRACILIS, E. ARCUATA, C. B. Adams. *Jamaica.*

E. NUTANS, E. EBURNEA, Muhlfeldt. *West Indies.*

E. BREVIUSCULA, Dunker. *Brazil.*

E. COMPACTA, E. THERSITES, Carpenter. *California.*

E. FUSCOSTRIGATA, Carpenter. *Cape St. Lucas, L. California.*

E. BERYLLINA, E. NANA, E. CIONELLA, Monterosato. *Mediterranean.*

E. MICROSTOMA, Brusina. *Mediterranean.*

E. CARNEOLA, Gould. *Japan.*

E. ACICULATA, Pease. *Sandwich Islands.*

E. CHYDÆA, E. CYLINDRATA, E. GOMPHUS, E. HYALINA.

E. PSILA, E. FASCIATA, E. CHASCANON, Watson. *West Indies.*

E. EPHAMILLA, E. OXYLATA (*Philippines*), E. ACANTHYLLIS (*Sandwich Islands*), E. ACERRIMA (*Cape York, Australia*), E. SARISSA (*Pernambuco*), E. LATIPES (*Torres Straits*), E. FAMELICA (*Azores*), E. CHYTA (*Ascension Island*), E. CAMPYLA (*Cape York, Australia*), E. FALLAX (*Viti Is.*), E. AMBLIA (between *Marion* and *Prince Edward Is.*), E. HEBES (*Pernambuco*), E. DISSIMILIS (*Port Jackson, Australia*), E. EURYCHADA (*Cape York, Australia*), all of Watson (Challenger Exped. Shells).

E. ANGULATA, E. ACICULARIS, E. CHRYSALLIDA, E. CLAVULA, E. CURVATA, E. DENTALIOPSIS, E. DEBILIS, E. EBURNEA, E. FLEXA, E. GIBBOSULA, E. INDEFLEXA, E. ODONTOIDEA, E. PINGUICULA, E. PANDATA, E. RECLINATA, E. SUBULA, E. SCITULA, E. SEMITORTA, E. STENOSTOMA, E. STYLATA, E. VALIDA, all of A. Adams. *Japan.*

E. PETTERDI, E. LEGRANDI, Beddome. *Tasmania.*

E. MARGINATA, E. APHELES, E. TASMANICA, Tenison-Woods. *Tasmania.*

E. CHATHAMENSIS, Hutton. = *Rissoa variegata*, Angas.

E. NITENS, E. AMABILIS, Brazier. *Torres Sts., N. Australia.*

E. AURANTIA, E. VITREA, Petterd. *Tasmania.*

E. INCERTA, E. DUBIA, Anton. *Hab. unknown*

E. BIPARTITA, Mörch. *Sonsonate, Central Ama.*

E. GUILDINGII, A. Ad. *West Indies.*

E. ACLIS, A. Ad. *Singapore.*

E. INCERTA, d'Orb. *Cuba.*

Subgenus SUBULARIA, Monts., 1884.

E. VARIANS, Sowb. Pl. 70, figs. 65–67.

Narrow, thin, pale fawn color, broadly brown banded, or with two narrow bands, or entirely brown. Length, 10–12 mill.

Xipixapi, Central America.

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E. RUTILA, Carpenter. Pl. 70, fig. 68.

Thin, glassy, narrow, apex attenuated; whorls 10, irregularly banded and blotched with pale red. Length, 7 mill.

California.

E. ELEGANTISSIMA, Folin. Pl. 70, fig. 69.

Pellucid, very shining; whitish, with two pale chestnut, narrow, distant bands and oblique chestnut strigations; whorls 10, rather convex; lip brown tinted. Length, 5 mill.

W. Coast of Central Ama.

E. BIVITTATA, H. and A. Ad. Pl. 70, fig. 70.

Attenuated, pale with two linear approximate chestnut bands in the middle, showing on the spire whorls. Length, 10 mill.

Sooloo Sea.

Described by Adams and Reeve as *E. bilineata*, preoccupied by Alder.

E. SUBULATA, Donovan. Pl. 70, fig. 71.

Narrow, rather thin, semitransparent, yellowish white, with three pairs of narrow chestnut bands on the body-whorl, and two pairs on the spire whorls, sometimes each pair coalescing into a single wider band. Length, 12–16 mill.

England to Mediterranean.

It is *Strombiformis glaber*, Dacosta; *E. fasciata*, Renieri; *E. trifasciata*, Adams; *E. flavocincta*, Megerle; *E. Cambessedesii*, Payr.; *E. Donovani*, Forbes; *E. lineata*, Sowb.

Var. PALLIDULA, Jeffreys.

Bands of a paler color, and more or less interrupted.

E. BILINEATA, Alder. Pl. 70, figs. 72–74.

Like the preceding species, but usually smaller; with a single pair of bands in the middle, and sometimes an obscure band just below the suture; upper whorls with a pair or occasionally a single band; some specimens have a tawny streak or blotch at the base. Length, 8 mill.

Norway to Mediterranean Sea.

Scarcely more than a variety of *E. subulata.*

E. BIFASCIATA, d'Orb. Pl. 70, fig. 75.

Acicular, spire sharp pointed; whorls about 12, white, with two distant narrow chestnut bands, visible on the spire.

Length, 6 mill. *Cuba.*

E. FULVOCINCTA, C. B. Adams. Pl. 70, fig. 76.

Whorls few, subventricose; whitish, with two interrupted chestnut bands. Length, 4 mill.

Jamaica.

E. VINCTA, A. Ad. Pl. 70, fig. 77.

Subfusiform, thin, pale, with two narrow chestnut lines on the middle; whorls a little convex, apex sharp pointed.

Length, 4 mill.

Japan.

The species figured as *E. vincta* in the Conch. Icon. has no authority appended, but as the description corresponds, I suppose it to be this species.

E. SAMOENSIS, Crosse. Pl. 70, fig. 78.

Highly polished, pellucid white, with obscure, interrupted chestnut lineate maculations, and occasional chestnut-tinted varices; whorls 10–11, somewhat flattened, margin of aperture chestnut. Length, 9 mill.

Samoan Is.

This may be a highly colored state of *E. acicula*, Gould.

E. UNILINEATA, Adams and Reeve. Pl. 70, fig. 79.

Thin, white, with a single narrow peripheral chestnut line, appearing on the spire. Length, 12 mill.

Sooloo Sea.

E. METCALFEI, A. Ad. Pl. 70, fig. 83.

Whorls very few, the last large, oval, subpellucid, white, ornamented with an interrupted chestnut band, and undulating oblique lines. Length, 11 mill.

Sandwich Is. (W. H. Pease).

E. RECTA, C. B. Ad. Pl. 70, fig. 81.

Semipellucid, white, with a very pale rosy tinge; whorls few, straight, the last oval, ventricose. Length, 10 mill.

Panama.

E. ACUTA, Sowb. Pl. 70, fig. 82.

Elongate, subcylindrical, dull white; whorls 12, rather flattened; aperture narrow. Length, 8 mill.

Bay of Montija, W. Coast of Central Am.

The apex is rather obtuse than acute.

E. NIVEA, A. Ad. Pl. 70, fig. 84.

White, semipellucid; whorls a little convex, suture margined, columella subtortuous and thin. Length, 7 mill.

Japan.

E. PURA, A. Ad. Pl. 70, fig. 85.

White, pellucid; whorls numerous, short, straight, suture margined; aperture narrow, columella rather tortuous.

Length, 7·5 mill. *Japan.*

Narrower than the preceding species.

E. PAUXILLUS, A. Ad. Pl. 70, fig. 86.

White, pellucid; whorls short, rather flattened, suture margined, aperture short, columella tortuous. Length, 6 mill.

Japan.

Judging by the figures, this species ought to be united to the preceding. *E. clara*, A. Ad. (unfigured) is made a synonym by Sowerby.

E. MARIÆ, A. Ad. Pl. 70, fig. 87.

Whitish, opaque, subcylindrical; whorls short, rather straight, suture distinct, apex obtuse, columella long, rather straight.

Length, 10 mill.

Japan.

E. MANZONIANA, Issel. Pl. 70, fig. 88.

Subulate, smooth, very shining, white, apex acute; whorls 8, planulate, the last attenuated at the base; aperture small, narrow. Length, 2·5 mill.

Gulf of Suez, Red Sea.

E ACUTISSIMA, Sowerby. Pl. 70, figs. 89, 90.

Pellucid, white, very thin, acuminated; whorls 8, slightly convex, the last large; aperture narrow, columella long, rather straight. Length, 9 mill.

Sydney, Australia.

I consider *E. Lesbia*, Angas (fig. 90), a synonym.

E. PEASEI, Tryon. Pl. 70, fig. 91.

Small, white, pellucid, short, somewhat arched and depressed in the middle; whorls few, suture margined; aperture expanded below. Length, 4·5 mill.

Sandwich Islands.

Appears from the figure to be more like a true *Eulima*.

Described by Pease as *E. distorta*, a name preoccupied by Defrance.

E. ACICULA, Gould. Pl. 70, figs. 92–95.

Transparent white, blotched and obsoletely margined at the suture with pale fawn color, highly polished; whorls short, rather straight, numerous. Length, 8–9 mill.

Fiji and Sandwich Is.

Described as a *Stylifer*, and may possibly belong to that genus. The synonyms are *E. aciculata*, Sowb. (fig. 93), *E. pyramidalis*, Sowb. (fig. 94), and *E. vitrea*, A. Ad. (fig. 95).

E. ATTENUATA, Sowb. Pl. 70, fig. 97.

Elongated, subcylindrical, narrow, semipellucid, white, faintly banded at the suture; whorls 13, flat, the last oblong, apex mucronate; aperture narrow, outer lip produced in the middle, subemarginated beneath, columella oblique. Length, 13 mill.

Viti Is.

Probably only a large form of the preceding species.

E. HEMPHILLII, Dall. Pl. 70, fig. 96.

Slender, subulate, brilliantly polished; whorls 9–10, flattened, suture inconspicuous; dark chocolate brown to blackish, with a lighter stripe at the suture. Length, 3 mill.

Cedar Keys, Fla.

A beautiful little species, remarkably colored.

Section HALIELLA, Monts., 1878.

E. STENOSTOMA, Jeffreys. Pl. 70 fig. 80.

Thin, white, semipellucid; whorls very slightly convex, the last subangulated in the middle, aperture narrow, columella long, vertical. Length, 6·5 mill.

Norway—Mediterranean.

Unfigured Species of Leiostraca.

E. CLAVELLA, E. NIXA, E. NITIDA, E. LANCEATA, E. LEACHII, E. LABIATA, E. TURGIDULA, E. TANTILLA, E. LEPIDA, E. SPICULUM, E. ARIEL, E. TITANIA, E. OBERON, E. CONSTANTIA, E. CASTA, E. LENTIGINOSA, E. HASTATA, E. SUBULINA, E. MIRANDA, E.

METULINA, E. PISTILLUM, E. CRYSTALLINA, E. PUSILLA, E. PYGMÆA, E. PUSIO, E. EXIGUA, E. NANA, E. PUMILA, E. PICTURATA, E. CONSPURCATA, E. BIZONA, E. CIRCUMCINCTA, E. BIFASCIALIS, E. TÆNIATA, E. BALTEATA, E. GRACILENTA, E. CINCTELLA, E. CINGENDA, E. INTERRUPTA, E. TANTILLA, E. CRASSULA, E. INQUINATA, E. SCITULA, E. SPRETA, E. HUMILIS, all of A. Adams. *Japan.*

E. MONTROUZIERI, Souverbie. *N. Caledonia.*

E. JEFFREYSIANA, Brusina. *Adriatic Sea.*

E. ONYCHINA, Folin. (Desc. and Fig. not accessible to me.) *West Indies.*

Subgenus BACULA, H. and A. Adams, 1863.

E. MIRIFICA, Nevill. Pl. 70. fig. 98.

White, shining; whorls 15, very narrow, tortuous, closely, minutely, spirally striated; columella bent backwards below; aperture striate within. Length, 8 mill.

Ceylon.

E. STRIATA, H. and A. Adams (unfigured). *China Sea.*

Subgenus APICALIA, A. Adams, 1862.

The distinctions between Apicalia and Mucronalia are slight. The type species of the present group is unfortunately unfigured, and the two additional species appear to me rather to belong to Mucronalia, the spire being straight.

E. HOLDSWORTHI, A. Ad. Pl. 70, fig. 99.

Thin, polished, ashy white, light brownish towards the apex, suture distinct, with a subpellucid, narrow margin; whorls 10, convex, apex styliform. Length, 6 mill.

Ceylon.

E. GÜNTHERI, Angas. Pl. 70, fig. 100.

Thin, subpellucid, shining, horn colored; whorls 7, narrowly shouldered below the suture, the last large, inflated, scarcely angulated at the periphery, apical whorls wanting.

Length, 14 mill.

New South Wales.

E. GIBBA, A. Ad. (unfigured). *Japan.*

Subgenus MUCRONALIA, A. Ad., 1862.

E. GRACILIS, Pease. Pl. 70, fig. 4.

Solid, polished, shining, white; whorls 7, convex, with deep suture. Length, 4 mill.

Tahiti.

Resembles somewhat in form *Apicalia Güntheri*, Angas.

E. NITIDULA, Pease. Pl. 70, fig. 2.

Solid, shining; whorls well rounded, stained with brown, apex white, mucronate, aperture small, columella short, rather twisted. Length, 4 mill.

Sandwich Is.

E. SUBPELLUCIDA, Pease. Pl. 70, fig. 3.

Short, ventricose, thin, lower part of body-whorl semitransparent; whorls few, spire straight, suture narrowly margined, last whorl obscurely angulated on the periphery, varices few, indistinct. Length, 20 mill.

Tahiti.

In this species the columella is somewhat drawn back below, making the aperture a little oblique; the tenuity of the body-whorl below the angle is the most distinguishing feature.

E. MUCRONATA, Sowb. Pl. 70, fig. 5.

Cylindrical, pellucid, narrow, with seven flat whorls and three additional apical ones which are suddenly contracted, mucronate, suture margined, aperture narrow, columella oblique, slightly tortuous. Length, 10 mill.

Port Jackson, Australia.

E. SANDWICHENSIS, Sowb. Pl. 70, fig. 21.

Ventricose, thin, white, opaque; whorls few, convex, the last rounded, opaque below. Length, 16 mill.

Sandwich Islands.

E. OBESULA, A. Ad. Pl. 70, fig. 6.

Ventricose, rather transparent, tinged with pale rose-color; whorls few, convex, rapidly increasing. Length, 9 mill.

Ins. Bohol, Philippines.

E. ROSEA, Pease. Pl. 70, fig. 7.

Conical, solid, rosy-brown; whorls 7, rounded; aperture rather round. Length, 5 mill.

Sandwich Is.

More conical in shape than *E. nitidula*.

E. FULVESCENS, A. Ad. Pl. 70, fig. 11.

Small, hyaline, light brown, ventricose; whorls few, rounded; apex mucronate; aperture a little laterally produced.

Length, 4·5 mill.

Ins. Labuan.

E. CALEDONICA, Morelet. Pl. 70, fig. 10.

Shining, smooth, polished, rather solid, whitish, more or less stained with light fawn-color; whorls 7–8, slightly convex, a little curved, suture submargined, apex sharply mucronate.

Length, 6 mill.

New Caledonia, Viti Is.

E. obesula is larger, with more rounded whorls; *E. rosea* and *E. fulvescens* have more convex whorls and the spire is straight.

E. SURVENTRICOSA, Sowb. Pl. 70, fig. 13.

White, short, rather solid, oval; whorls few, inflated; aperture oval, short, outer lip thin. Length, 6·5 mill.

Hab. unknown.

E. MINDOROENSIS, Ad. and Reeve. Pl. 70, fig. 8.

Whitish, thin, short, ventricose; whorls few, inflated, the last large, oval, aperture rather oval, columella slightly tortuous.

Length, 9 mill.

Philippines.

It has been extensively distributed from the Viti Islands under the name of *E. brevicula*, Dunker. I do not know whether this name has been published.

E. BICINCTA, E. EXILIS, E. LACTEA, E. SUBULA, all of A. Adams.

Japan.

Subgenus SELMA, A. Ad., 1864.

E. SUCCINIOLA, A. Ad.

Elongately oval, thin, rimate, subdiaphanous, corneous, tinged with chestnut-color, spire short; whorls $3\frac{1}{2}$, scarcely convex, the last large; aperture oblong; inner lip chestnut-stained, with a spiral, chestnut-colored plica, outer lip simple.

Japan.

This, the only species, is unfigured. No dimensions are given.

Subgenus Styliferina, A. Adams, 1860.

Adams writes concerning this group:—

The genus *Entoconcha* of J. Müller, which is parasitic on *Sinapta*, also has "the columellar margin straight;" but the form is described as being very different from *Styliferina*, there being almost no spire, and the aperture being transverse and semilunar. I have never seen a specimen of *Entoconcha*, which is also said to be operculate. My shells were, unfortunately, in the case of both the species, dredged dead, though perfect. I examined dozens of the blue Asterinæ that came up with them, but found no parasite, nor was I more fortunate with Spatangi or Clypeasteres.

In describing *E. callosa*, Mr. Adams places the group in Litiopidæ; Dr. Fischer and myself have continued to regard it as a member of the present family.

E. orthochila, E. gonochila, A. Adams (unfigured). *Japan.*
E. callosa, A. Adams (unfigured). *Gulf of Suez.*
E. turrita, Carpenter (unfigured). *California.*

Subgenus Lambertia, Souverbie, 1869.

E. Montrouzieri, Souverbie. Pl. 70, fig. 15.

Pupiform, thin, very smooth, polished, translucent, white, with very numerous milk-white lineolations; whorls 5, convex, rapidly enlarging, apex short, styliform, mamillary. Length, 10 mill.

New Caledonia.

Described from a single specimen.

Subgenus Amaurella, A. Adams, 1867.

E. Japonica, A. Adams. Pl. 70, fig. 16.

Rather solid, globose, short, spire produced, attenuated, acuminated, last whorl globose, aperture rather short, acuminated below, columella tortuous, rather solid. Length, 6·5 mill.

Japan.

E. glabrata, A. Ad. Pl. 70, fig. 12.

Small, white, polished, spire with few whorls, the last one elongated, columella rather straight. Length, 11 mill.

Japan.

E. SEMISTRIATA, A. Ad. Pl. 70, fig. 17.

White, partially very finely spirally striated; whorls 4, the last ovate, oblong. Length, 12 mill.

Japan.

Subgenus SCALENOSTOMA, Desh., 1863.

E. CARINATA, Desh. Pl. 70, fig. 14.

White; whorls 11, the earlier ones a little convex, subsequently planulate, the periphery carinate, base convex. Length, 13 mill.

Isle of Bourbon.

E. APICULATA, Souverbie. Pl. 70, fig. 18.

White, translucent; whorls 13, rather convex, the last only showing a strong peripheral carina. Length, 7·5 mill.

New Caledonia.

E. RANGII, Folin. Pl. 70, fig. 20.

Yellowish; whorls 12, smooth, periphery carinate. Length, 2·7 mill.

———

Panama.

E. DESHAYESII, A. Ad. (unfigured). *Gulf of Suez.*

Subgenus SUBEULIMA, Souverb., 1875.

E. LAMBERTI, Souverb. Pl. 70, fig. 19.

Shell much curved, consisting of twelve whorls, with carinated periphery, the upper whorls with fine spiral striæ, soiled white. Length, 19 mill.

New Caledonia.

On the right side are varices as in the curved species of *Eulima;* in fact this appears to be simply a *Scalenostoma* with curved spire.

Genus NISO, Risso, 1826.

N. SPLENDIDULA, Sowb. Pl. 71, fig. 24.

Solid, smooth, whitish purple, interruptedly brown-banded on the periphery, above and below the suture, and surrounding the umbilicus; whorls numerous, suture and varices impressed and edged with brown. Length, 1·5 inches.

S. Elena, W. Co. of Central America.

N. MARMORATA, Sowb. Pl. 71, fig. 21.

Solid, whitish tessellately marbled with chestnut; whorls rather convex, the last rounded. Length, 23 mill.

Philippine Islands.

N. INTERRUPTA, Sowb. Pl. 71, figs. 22, 23.

Whitish, shining, with linear chestnut truncated spots at the varices, sometimes obsolete; whorls numerous, the last with angular periphery. Length, 19 mill.

West Coast of Central America (Cuming).

Dunker includes it in his Japanese list (Moll. Mar. Jap., 89).

N. BRUNNEA, Sowb. Pl. 71, fig. 25.

Solid, chocolate brown; whorls convex, the last slightly angular on the periphery, and paler on the angle, umbilicus small. Length, 17 mill.

Isl. of Hanan, China Sea.

N. GONIOSTOMA, A. Ad Pl. 71, fig. 26.

Solid, pale fawn-color, with a wide light chestnut-colored band; whorls numerous, short. Length, 20 mill.

Isl. of Burias, Philippines.

N. TEREBELLUM, Chemn. Pl. 71, fig. 27.

Solid, fawn-color, paler at the suture and around the umbilicus; whorls numerous, short, a little convex, umbilicus surrounded by a keel. Length, 23 mill.

Nicobar.

N. CANDIDULA, A. Ad. Pl. 71, fig. 28.

Solid, white; whorls short, rather convex, umbilicus moderate, columella arched. Length, 23 mill.

Philippines.

N. SANDWICHENSIS, Sowb. Pl. 71, fig. 29.

White, solid, last whorl broad, angular; umbilicus small, round, aperture acute below. Length, 8 mill.

Sandwich Islands.

N. ÆGLEES, Bush. Pl. 71, fig. 39.

Thin, semitransparent, smooth, shining; whorls 12, suture indistinctly defined by a dark chestnut line; above and below this there is an indefinite band of yellowish white, becoming gradually yellowish, light brownish or purple-brown towards the middle of the whorls, periphery angulated, umbilicus margined

by a chestnut line, margin of aperture also chestnut-colored, at irregular intervals the whorls are somewhat obliquely crossed by chestnut lines. Length, 7·5 mill.

Cape Hatteras, North Carolina.

N. TRILINEATA, Mörch (unfigured). *Guinea.*
N. OBTUSA, Anton (unfigured). *Hab. unknown.*

Section VOLUSIA, A. Ad., 1861.

N. IMBRICATA Sowb. Pl. 71, fig. 31.

Whitish, longitudinally striated and lineated with red; whorls concave above the periphery—which is subangular.

Length, 19 mill.

St. Elena, W. Coast of Central America.

Genus HOPLOPTERON, Fischer, 1876.

H. TERQUEMI, Fischer. Pl. 71, figs. 33–35.

Minute, thin, white, translucent, shining; whorls 7, the first four smooth, minutely flexuously striated, the others developing a long wing on either side. Length, 1·15 mill.

China Sea.

A section of this singular shell shows it to be similar to *Eulima* as to its interior. The figures represent different stages of growth.

Genus STYLIFER, Brod., 1832.

S. STIMPSONII, Verrill. Pl. 71, fig. 37.

White, swollen, spire short, rapidly enlarging; whorls 4–5, the last very large, smooth, a slightly impressed revolving line just below the suture. Length, 3·75 mill.

George's Bank, Block Island, off Coast of New Jersey, on Echini.

S. TURTONI, Brod. Pl. 71, figs. 32, 36.

Subglobose, spire small, acuminated, produced; whorls angular above, the last very large; outer lip very sinuous.

Length, 4·5 mill.

Northern Europe to Canary Is., on Echini.

This species is found near the anal opening of its host, and Dr. Jeffreys was therefore of opinion that it derived its nourish-

ment from the excrement of the urchin, and that its suctorial proboscis, and the absence of a radula or jaw supports this view.

It is *Phasianella stylifera*, Turton, *S. astericola*, Brown, and *S. globosus*, Johnston.

S. ASTERICOLA, Brod. Pl. 71, fig. 38.

Ovate globose, spire short, acuminated; whorls few, the apical ones minute, lip sinuously produced above. Length, 10·5 mill.

Galapagos Isl., on Asterias helianthus.

S. Broderipii, Adams, is a synonym.

S. OVOIDEUS, H. and A. Adams. Pl. 71, fig. 39.

Subglobose, spire moderately produced; whorls convex, the apical ones very minute; aperture pyriform, outer lip slightly compressed above, sinuously produced. Length, 11 mill.

Borneo, on an Asterias.

This is *S. astericola*, Ad. and Reeve, not Brod., but I really can see no valid differences between this and the two preceding species.

S. ORBIGNYANUS, Hupé. Pl. 71, fig. 40.

Short, ovate, inflated, pellucid, very shining, yellowish white; whorls 7, well-rounded, with deep suture. Length, 6 mill.

Australia.

Found imbedded in the deformed spire of *Cidaris imperialis.*

S. DUBIA, Baird. Pl. 71, fig. 41.

Shell globose, spire produced, pyramidal, acuminated, apical; whorls attenuated. Length, 6·5 mill.

New Caledonia.

S. MITTREI, Petit. Pl. 71, fig. 42.

Very smooth, pellucid, yellowish white; whorls 7–8, rounded, suture profound. Length, 11·5 mill.

Indian Seas (Mittre.), *Polynesia* (Pease).

I have received from Mr. Pease, under his MS. name of *Mucronalia tumida*, a shell which I refer to this species.

S. EBURNEUS, Desh. Pl. 71, fig. 43.

Ivory-white, very shining, polished; whorls 9, the first two cylindrical, the others very convex, with deep linear sutures. Length, 10 mill.

Isle of Bourbon.

S. APICULATUS, Souverbie. Pl. 71, fig. 44.

Thin, very shining, translucent, subhyaline white, apex milky; whorls 10, very convex, with deep sutures, the five superior ones slowly increasing, the others rapidly, thinly subobliquely striulate. Length, 11·5 mill.

New Caledonia.

S. BRAZIERI, Angas. Pl. 71, fig. 47.

Smooth, pellucid, white, polished; whorls 6, flattened just below the suture, which is finely, callously margined, apex styliform. Length, 4 mill.

Port Jackson, Australia.

S. CUMINGIANUS, Adams. Pl. 71, figs. 48, 46.

Spire acuminated, apex styliform; whorls numerous, the last inflated; aperture short, the columella rather straight. Length, 12 mill.

Hab. unknown.

S. PYRAMIDALIS, Reeve (fig. 46), figured but not described, and no locality given, appears to be very similar. Deshayes ascribes to it a shell from the Isle of Bourbon.

S. SUBULATUS, Brod. & Sowb. Pl. 71, figs. 49, 50.

Whorls 9–10, the superior ones styliform, afterwards rounded, suture linear, lightly impressed. Length, 15·5 mill.

West Indies.

S. bulbiformis, Sowb. (fig. 50), is probably a synonym.

S. SPECIOSUS, H. Ad. Pl. 71, fig. 57.

Hyaline, spire attenuated and styliform above and somewhat twisted, lower whorls inflated, somewhat straight-sided; aperture short, columella rather straight. Length, 16 mill.

Mauritius.

S. BARRONI, A. Ad. Pl. 71, fig. 51.

White, shining, semipellucid, apex mucronate; whorls 7, constricted, angulated above, longitudinally obliquely striated. Length, 6·5 mill.

Hab. unknown.

Found on a tropical asterias; evidently deformed.

S. EXARATUS, A. Ad. Pl. 71, fig. 52.

White, shining, semipellucid; whorls a little convex, transversely sulcate, longitudinally lightly striate, suture impressed,

apex mucronate; aperture subeffuse at base, the lip sinuous, the margin thickened and expanded. Length, 19 mill.

Philippines.

S. CORALLINUS, Chemn. Pl. 71, fig. 45.

White, subulate, very smooth, thin, pellucid; whorls about 12. Length, 16 mill.

West Indies.

S. SUBANGULATUS, A. Ad. Pl. 71, fig. 53.

White, shining, semipellucid, apex mucronate, twisted; whorls numerous, a little convex, with transverse elevated lines, the last with subangulate periphery. Length, 18 mill.

West Indies.

Mörch describes a var. *abbreviata.*

S. THOMASIÆ, Sowb. Pl. 71, fig. 58.

Attenuated and suddenly contracted towards the apex, last whorl obtusely angular; aperture obliquely subquadrate, columella rather straight, acuminated below. Length, 21 mill.

St. Thomas, W. I.

S. ATTENUATUS, Sowb. Pl. 71, fig. 55.

Very narrow; whorls numerous, the last one subangular on the periphery, apex a little twisted. Length, 16 mill.

St. Thomas, W. I.

S. PAULUCCIÆ, Fischer. Pl. 71, fig. 54.

White, smooth, shining, semipellucid; whorls 11–12, the embryonal ones laterally deflexed, the others subrotund, suture lightly impressed. Length, 10 mill.

Red Sea.

S. DEFORMIS, Pease. Pl. 71, fig. 56.

Thin, smooth, shining, pellucid, white, indistinctly longitudinally striated; whorls 6–10, convex, suture narrowly margined, last whorl swollen. Length, 12 mill.

Paumotus.

Pease writes: "scarcely two specimens agree in shape," a lesson to the species makers.

S. FASTIGIATUS, A. Ad. Pl. 71, fig. 59.

Slightly perforated, spire acuminated, apex attenuated and obliquely bent; whorls numerous, rather convex, the last large, round, aperture narrow. Length, 19 mill.

Hab. unknown.

S. SOLIDUS, A. Ad. Pl. 71, fig. 60.

Subulate, rather solid, opaque; whorls numerous, the apical small, tortuous; aperture rather short, acuminated below.

Length, 12·5 mill.

Hab. unknown.

S. TASMANICUS, Tenison-Woods. Pl. 71, fig. 61.

Milky-white, pellucid, smooth, shining; whorls 7, convex, suture impressed. Length, 4 mill.

Tasmania.

Figured from a specimen. Is it not rather an Eulima?

Unfigured Species.

S. CURTA, Verrill.	Off *Martha's Vineyard*, 410 fms.
S. BRYCHINA, Watson.	*So. Atlantic.*
S. COMATULICOLA, Graff.	*Mediterranean.*
S. LODDERÆ and S. ROBUSTUS, Petterd.	*Tasmania.*
S. ROBUSTUS, Pease.	*Sandwich Is.*

Subgenus CYTHNIA, Carp., 1864.

S. ASTERIAPHILA, Carp. (unfigured).	*Cape St. Lucas, L. Cal.*
S. TUMENS, Carp. (unfigured).	*Mazatlan.*
S. ALBIDA, Carp.	*Southern California.*

Subgenus PLICIFER, H. Adams, 1868.

S NEVILLI, H. Adams. Pl. 71, fig. 62.

Thin, semiopaque, whitish, suture distinct; whorls $6\frac{1}{2}$, styliform at the apex, the rest irregularly flexuosely striate and spirally lirate; columella callous, spirally plicate; lip profoundly sinuated behind. Length, 3·5 mill.

Ceylon.

Family *PYRAMIDELLIDÆ*.

Shell turriculated, composed of numerous whorls, with long spire, the apex heterostrophe; aperture entire, the outer lip generally sharp, the columella with one or several plications. Operculum corneous, paucispiral, with excentric nucleus, the columellar margin sinuated.

Animal with flattened, ear-shaped tentacles channeled outside towards their extremity, connate at the base; eyes sessile, immersed at the inner sides of the base; proboscis long, retractile, coming from an orifice situated immediately below the base of the tentacles; veil distinct, elongated, entire or divided in front reaching to the anterior margin of the foot; foot truncated or sinused in front, extending far beyond the head, attenuated behind. Probably carnivorous, but the lingual teeth are wanting, or rudimentary.

No zoological characters of importance separate this family from the Turbonillidæ; the distinction is mainly one of convenience, the present group containing those shells, usually larger, having two or more columellar plications (only one in Syrnola), the Turbonillidæ being composed of minute shells having a single small plication, or without any.

The heterostrophe and turned-over summit of the spire is one of the most remarkable features of the shell, a character found in few other families of mollusks. In the animal the presence of a mentum or veil is also a curious feature. It is developed below the mouth, and may be derived from the conjunction of buccal tentacles, or perhaps represents the propodium, as in Natica. The genus Pyramidella and its subgroups contain all the living species of the family, and a few fossils, cretaceous and tertiary; the other genera are exclusively fossil. "The Pyramidellidæ present subjects of much interest to the students of extinct mollusca; numerous forms, bearing all the aspect of being members of this family occur. . . . Many of them are gigantic compared with existing species, and the group, as a whole, may

be regarded rather as appertaining to past ages than the present epoch."—FORBES.

Pyramidella and Obeliscus have been monographed by:

Kiener, Coquilles vivantes, 6 species.

Arthur Adams in Sowerby's Thesaurus Conchyliorum, ii, 53 species.

Reeve, Conch. Icon., xv, 45 species, 1862.

Synopsis of Genera.

Genus PYRAMIDELLA, Lam., 1799.

Shell turriculated, of many whorls, longitudinally ribbed or smooth; aperture semioval, entire, rounded in front, the columella straight, with anterior strong plications, outer lip sharp, often plicate within.

Inhabits tropical seas. Fossil, cretaceous and tertiary.

Subgenus PYRAMIDELLA (*sensu stricto*).

Shell smooth—typically with perforated axis. P. DOLABRATA, Linnæus.

Obeliscus (Humphrey, 1797), Mörch, 1852, is a synonym.

Section LONCHÆUS, Mörch, 1874.

Shell imperforate, last whorl with a median sulcus. P. PUNCTATA, Chemn.

Section TRIPTYCHUS, Mörch, 1874.

Shell subulate, spirally paucilirate, aperture lirate within, subsinuated in front, columella triplicate. P. NIVEA, Mörch.

Section AMOURA, de Folin, 1873.

Shell subcylindrical, elongated, with feeble longitudinal ribs and two spiral cords; last whorl concentrically striated at the base; columella biplicate. P. ANGULIFERA, Folin.

Section TIBERIA, Jeffreys, 1875.

Shell very small, umbilicated, columella biplicate. P. NITIDULA, A. Ad.

Subgenus OTOPLEURA, Fischer, 1885.

Shell oval, turriculated, pupiform, with longitudinal ribs; aperture oval, subchanneled at the base of the columella; colu-

mella with several plications, lip thickened, often expanded. P. AURIS-CATI, Chemn.

This is the restricted Pyramidella of H. and A. Adams and most of their successors; the smooth shells which Lamarck designated by that name, being generally known as Obeliscus. The erroneous application of these names has become so well-established that I confess I follow Dr. Fisher with some reluctance in his correction of the errors.

Subgenus SYRNOLA, A. Adams, 1860.

Shell small, subulate, polished; whorls flattened, suture well marked; columella with a single plication, outer lip simple.

The Syrnolæ are small, slender Pyramidellids, with a single columellar plait. P. GRACILLINA, A. Ad.

Section AGATHA, A. Ad., 1860.

Shell oval acuminated; spiral plication very strong. P. AUSTRALIS, Angas.

Section AMATHIS, A. Adams, 1861.

Aperture dilated, rounded in front, acute behind. Possibly synonymous with *Agatha*. P. VIRGO, A. Ad.

Section OSCILLA, A. Adams, 1867.

Shell solid, ovate or pyramidally turreted, imperforate; whorls strongly spirally lirate; aperture oval or subquadrate, with a strong, transverse, median parietal plication. P. ANNULATA, A. Ad.

Section ORINA, A. Adams, 1870.

Shell conoidal, profoundly umbilicated; whorls flattened, smooth; aperture subquadrangular, with a single columellar fold. O. PINGUICULA, A. Ad.

Section ELUSA, A. Adams, 1861.

Shell subulate, turreted; whorls longitudinally plicate; aperture ovate, columella with a single plait, outer lip lirate within.

P. SUBULATA, P. TERES, A. Ad.

The above groups are all founded on Japanese species, mostly unfigured; the characters appear to be unimportant.

Subgenus CHRYSALLIDA, Carpenter, 1857.

Shell small, pupiform, generally cancellated; peristome continuous, edge of lip simple, columella profoundly but distinctly plaited; operculum (in the typical species) radiately corrugated. *West Coast of America*, *Japan*, *West Indies*. P. COMMUNIS, C. B. Ad.

This group might be equally well placed in *Odostomia*.

Section MORMULA, A. Ad., 1863.

Subulately turreted, rissoid, solid, thick, longitudinally plicate; aperture large, columella spirally tortuous, lip thickened within, margin acute. P. RISSOINA, P. ACLIS, A. Ad.

Lancea, Pease, 1867, is a synonym.

Section STYLOPTYGMA, A. Ad., 1860.

Shell pupiform, subpellucid; whorls a little convex, with transverse grooves; aperture subquadrangular, lip dilated, columella obliquely plicate above. P. STYLINA, A. Adams.

Subgenus ACTÆOPYRAMIS, Fischer, 1885.

Shell elongate, imperforate, subconical; whorls numerous, with spiral striæ, sometimes cancellated; aperture oval-elongated, rounded in front; columella with a strong spiral fold. P. STRIATA, Gray.

The name is substituted for *Monoptygma*, Gray, 1840, preoccupied by Lea, 1833. These shells recall the genus *Actæon* by their form and sculpture, and may possibly include some of the small groups *Myonia*, *Kleinella* and *Leucotina* of A. Adams, now arranged with that genus.

Section MUMIOLA, A. Adams, 1863.

Shell thin, elongate or ovate; whorls convex, cancellate or granulose; aperture ovate, the lip-margin regularly arcuate. P. SPIRATA, A. Adams. *Philippines*.

Section CARELIOPSIS. Mörch, 1874.

Shell turriculated, having the form of *Carelia Cumingii*. P. STYLIFORMIS, Mörch. *West Indies*.

Genus SYRNOLOPSIS, E. A. Smith, 1880.

Shell subulate, smooth, imperforate; aperture broadly sinuated at the base, outer lip sinuous, slightly thickened, furnished far within with one or two prominent liræ, columella with a distinct plait. Operculum unknown. S. LACUSTRIS, Smith. *Lake Tanganyika, E. Africa* (fresh water).

The systematic position of this group is very uncertain: being lacustrine, Dr. Fischer has included it with doubt in the Hydrobiinæ, but the characters of the shell (the apex is eroded) appear to me to be closer to the present family.

* * *

Genus NERINÆA, Defrance, 1825.

Shell elongated, many-whorled, nearly cylindrical; aperture channeled and produced in front, with plications within the outer lip and on the columella. About 150 species, Jurassic and Cretaceous. N. TRINODOSA, d'Orb., Struct. and Syst. Conch., t. 68, f. 10; N. TRACHEA, Desh., Ibid. t. 68, f. 13.

Section NERINÆA (*sensu stricto*).

Folds simple, two or three on the columella, one or two within the outer lip; axis solid or perforated.

Section NERINELLA, Sharpe, 1850.

Columella solid, folds simple, one on the outer lip, and one or none on the columella.

Section TROCHALIA, Sharpe, 1850.

Columella perforated, with one fold, outer wall simple, or thickened, or with one simple fold.

Section PTYGMATIS, Sharpe, 1850.

Columella solid or perforated, usually with three folds; outer wall with one to three folds, some of them complicated in form.

Subgenus HALLOYSIA, Briart and Cornet, 1878.

Shell elongated, turriculated; whorls numerous, axis widely umbilicated; aperture rounded or subquadrangular, columella biplicate.

N. BIPLICATA, Br. et Corn. Struct. and Syst. Conch., t. 68, f. 14.

L. Eocene of *Mons, Belgium.*

Subgenus CRYPTOPLOCUS, Pictet and Campiche, 1854.

Shell like *Nerinæa*, but without columellar or labral plaits; there is one plication on the posterior face of the aperture (as in some Cerithiums); aperture rounded in front, without channel; axis umbilicated or imperforate; 7 species, Jurassic and Cretaceous. *Europe.*

N. MONILIFERA, d'Orb.

Subgenus APTYXIS, Zittel, 1873.

Shell turreted, nearly cylindrical, imperforate; whorls numerous, not embracing; aperture lengthened subquadrangular, without plications, the columella with a fold-like thickening.

The synonyms are *Pachystylus*, Gemmellaro, 1878, and *Aptyxiella*, Fischer, 1885. The latter name was given because of *Aptyxis*, Troschel, 1868—which, however, is a synonym.

A. SEXCOSTATA, d'Orb. Jurassic.

? Genus SOLENISCUS, Meek and Worthen, 1860.

Shell fusiform, smooth, body-whorl contracted below into a distinct canal, columella with a single oblique plait.

S. TYPICUS, Meek. Carboniferous, *Illinois.*

Genus PYRAMIDELLA, Lam., 1799.

Typical Group.

P. VENTRICOSA, Guerin. Pl. 72, figs. 63–65.

Slightly striated longitudinally, the last whorl ventricose; yellowish white with irregular light chestnut undulating longitudinal stripes, more or less intensified into revolving bands; columella triplicate. Length, 1·25 inches.

Viti Islands, Vanikoro, Singapore.

Besides the type, I figure a white variety. *P. scitula*, A. Ad. (fig. 65), is only a younger state of this species.

P. CINCTA, Reeve. Pl. 72, fig. 66.

Smooth, white, with a broad central chestnut zone, appearing on the spire whorls; columella triplicate, perforation narrow.

Length, 20 mill.

Philippines.

P. FASTIGIUM, A. Ad. Pl. 72, fig. 67.

White, polished, narrowly umbilicated, last whorl large, obsoletely angulated on the periphery; columella triplicate, outer lip strongly plicate within. Length, 18 mill.

Isl. of Bohol, Philippines.

P. PERFORATA, A. Ad. Pl. 72, fig. 68.

Widely and deeply umbilicated, white, polished, with a spiral pale chestnut band; whorls flattened, the last large, subangulate on the periphery. Length, 16 mill.

St. John's, W. I.

P. BALTEATA, A. Ad. Pl. 72, fig. 69.

Umbilicated, white, shining, with a chestnut band, the whorls flattened, the last one subangulated on the periphery, columella biplicate. Length, 6·5 mill.

Isl. Mindanao, Philippines.

P. PUSILLA, A. Ad. Pl. 72, fig. 70.

White, perforate, apex obtuse; whorls rather flattened, suture deep, last whorl subangulate; columella biplicate.

Length, 4·5 mill.

Luzon, Philippines.

P. DOLABRATA, Linn. Pl. 72, figs. 71–74.

Umbilicated, smooth, white, with three or four narrow chestnut spiral lines on the body, and two on the spire-whorls; outer lip often lirate within. Length, 1–1·4 inches.

West Indies.

Strombus columella, Meusch., is a synonym.

Var. SUBDOLABRATUS, Mörch.

Shell thin, shortly conical, last whorl inflated, lip without ridges. Runs into the type form.

West Indies.

Var. TEREBELLUM, Müll. Fig. 73.

Whorls somewhat less convex, bands a little wider and chocolate colored.

Sandwich Islands, Viti Is., Mauritius, Red Sea.

Usually known under the name of the next variety, with which it is probably synonymous.

Var. TEREBELLOIDES, A. Ad. Fig. 74.

More slender than the last variety, columella with two instead of three plicæ; whorls with two or three slim chestnut lines.

Length, 1 inch. *Polynesia.*

P. PULCHELLA, A. Ad. Pl. 72, fig. 75.

Shell polished, yellowish white, with a sutural chocolate band, appearing on the periphery of the last whorl; columella with two plications.

Red Sea, Japan.

Described as having a single plication on the columella, which would place it in Syrnola, but a second plica is more or less developed.

Section LONCHÆUS, Mörch, 1874.

P. ACUS, Gmel. Pl. 72, figs. 76–78.

Polished, white, with dark chestnut or chocolate spots, usually arranged in three revolving series on the spire whorls and five series on the body; columella three-plaited, the upper plait largest, lip sometimes lirate within. Length, 1·25–2 in.

Polynesia, Mauritius, Red Sea.

It is *P. punctata* (Chemn.), Mörch; *P. guttata*, Link, and *P. maculosa*, Lam. The peripheral groove becomes in this, as in most of the other species of the section, either obsolete or indicated by a slight angle.

P. SULCATA, A. Ad. Pl. 72, figs. 79–83.

White, nebulously longitudinally strigate with pale orange-chestnut, frequently breaking up into revolving series of dots; aperture channeled at the aperture, columella three-plicate.

Length, 1–1·5 in.

Sandwich Is., Philippines, Australia, Mauritius, Red Sea.

Adams has used for this species a MS. name given it by Nuttall; *P. tessellata*, A. Ad. (fig. 80), is founded on a younger slimmer individual; *P. monilis*, A. Ad. (fig. 81), represents a faded specimen of the same form and age, and *P. teres*, A. Ad. (fig. 82), is from a still younger, faded specimen. All these forms, and the intermediates, are represented in the series before me. I am inclined to place here also, *P. Pratii*, Bernardi (fig. 83), a specimen from unknown locality, having the characters of coloration and basal sinus of *P. sulcata*, but with a deeper peripheral groove and angle than usual.

P. TURRITA, A. Ad. Pl. 72, fig. 84, 85.

Fulvous, obsoletely maculated with a deeper tint; whorls

flattened, suture deep, crenulated, frequently whitish, last whorl with a distinct median sulcus, aperture produced in front.

Length, 22 mill. *North Australia*, *New Caledonia.*

The shell which is figured in the Thesaurus Conchyliorum as *P. gracilis*, Brocchi (fig. 85), appears to be very similar to this species; the true *P. gracilis* is a Turbonilla and = *T. lactea*, Linn. Issel identifies a Red Sea species with the figure of *gracilis* in Kiener, but recognizes the distinction of that figure from Brocchi's species, and calls it *P. Kieneri.*

P. Chemnitziana, A. Ad. Pl. 72, fig. 86.

Narrowly elongated, white; whorls numerous, rather flattened, with angle at the suture, and on periphery of last whorl, aperture small, columella two-plaited. Length, 9 mill.

Viti Is.

P. Garrettii, Tryon. Pl. 72, fig. 87.

Whorls flattened, yellowish, with chestnut colored nebulous longitudinal strigations, suture channeled, last whorl with a peripheral sulcus; columella three-plicate, the upper fold very strong, lower ones approximate and more oblique.

Length, 15 mill. *Viti Islands* (Garrett).

P. conica, C. B. Adams. Pl. 72, figs. 88, 89.

Whorls flattened, with deep channeled suture, which is sometimes slightly crenulated, periphery also channeled; fulvous, faintly banded with darker color; aperture produced below, columella triplicate. Length, 13–15 mill.

Florida, *Panama*, *Mazatlan*, *Cape St. Lucas*, *San Diego*, *Cal.*

Described from Panama; *P. variegata*, Carp., from Cape St. Lucas, etc., also answers to the description perfectly. I have received the same species from Sarasota Bay, Fla., under the erroneous name of *P. tessellata*, Ads. It was dredged there in two fms. water by Mr. Henry Hemphill.

P. hastata, A. Ad. (fig 89), from St. Elena, W. Columbia, is another synonym; it is included by Mörch in his West Indian catalogue as a synonym of *P. candida*, Meuschen.

P. canaliculata, Sowb. Pl. 73, fig. 90.

Whorls flattened, yellowish, banded and spotted with chestnut, with fine longitudinal white raised strigations, appearing like low

rounded riblets, with occasional darker maculations, especially on the base, suture and periphery channeled; aperture channeled at the base, columella straight, three plaited. Length, 15 mill.

Sandwich Islands.

P. ACHATES, Gould. Pl. 73, fig. 91.

Shell pupiform, with obtuse apex and elongated aperture; light fulvous, with pale chestnut maculations in revolving series; suture and periphery channeled; columella triplicate.

Length, 12 mill.

W. Coast of Mexico.

P. clavulus, A. Ad., is a synonym.

P. JUCUNDA, Angas. Pl. 73, fig. 92.

Smooth, shining, white, with two chestnut bands on each whorl, three on the body-whorl, suture impressed; "columella with a prominent twisted fold encircling the pillar."

Length, 6 mill.

Port Jackson, Australia.

According to the description this would be a *Syrnola*, but the figure shows *two* columellar folds.

P. PAUMOTENSIS, Tryon. Pl. 73, fig. 93.

Shell thin, smooth, hyaline, white, upper whorls suddenly tapering to an acute apex, base slighty produced; whorls 9, convex, suture margined; columella slightly callous, with two oblique plaits, the lower one most conspicuous, the upper smaller and deep-seated. Length, 10 mill.

Paumotus and *Society Islands.*

The form of the spire and position of the plicæ indicate for this species a distinct section of the genus. It much resembles *Agatha Australis*, Angas, in the lower plication. Described as *P. hyalina*, Garrett; I have changed the name on account of *P. hyalina*, Dunker.

Unfigured Species of Pyramidella and Lonchæus.

P. VITREA, A. Ad. (Described as a *Syrnola*, but afterwards made an *Obeliscus* = *Pyramidella*). *Japan.*

P. TRIFASCIATA and P. EBURNEA, A. Ad. *Japan.*

P. SOLIDA, Sowerby. *Tranquebar.*

P. TASMANICA, Petterd. *Tasmania.*

P. ROSEA, Hutton. *New Zealand.*
P. MINUTA, Phil. *Red Sea.*
P. SUTURALIS, Maltzan. *Ins. Gorée, W. Africa.*
P. FLORIDANUS, Mörch. *West Indies.*
P. BICOLOR, Menke. *California.*

Section TRIPTYCHUS, Mörch, 1874.

P. NIVEA, Mörch. Pl. 73, fig. 1.

White, slender; whorls flattened, each with three spiral ribs, the two upper ones nodulous, body-whorl with two plain ribs below the nodulous ones, and three revolving ridges below the periphery, forming columellar folds; aperture produced below.

Length, 8·5 mill.

Key West, Fla.; West Indies.

P. vincta, Dall, is a synonym. The shell is scarcely a *Pyramidella*—the sculpture and plications are different.

Section AMOURA, de Folin, 1873.

P. ANGULIFERA, de Folin. (Description inaccessible to me.)

Section TIBERIA, Jeffreys, 1875.

P. NITIDULA, A. Adams. Pl. 73, fig. 96.

Deeply umbilicated, small, white, often banded, smooth; whorls few, rather flat, suture impressed, columella two-plaited.

Length, 4 mill.

Japan, Mediterranean Sea, Cape Verd Is., West Indies.

These localities are all abundantly confirmed. Dr. Jeffreys writes: "I have carefully compared my 'Porcupine' and Mediterranean specimens with those from Japan and Corea, which I received from the late Mr. Arthur Adams and my friend Capt. St. John, and I cannot detect the slightest difference between any of them in shape, colored band, umbilicus or dentition of the pillar" (*Zool. Proc.*, 364, 1884). Dr. Jeffreys considers the following synonymous:

P. MINUSCULA, Monts.; P. MEDITERRANEA, Monts.; P. SUBFARCINATA and P. TINCTA, Watson; P. LÆVIUSCULA, Jeffreys (not S. Wood); P. EXILIS (var.), Jeffreys.

Subgenus Otopleura, Fischer, 1885.

P. auris-cati, Chemn. Pl. 73, fig. 95.

Smooth, white, longitudinally ribbed, ribs ending in nodules at the sutures, with spiral rows of chestnut spots, interstices of the ribs spirally striated. Length, ·75–1 inch.

Philippines, Mauritius.

The synonyms are *P. spiralis*, Wood, *P. plicata*, Lam.

P. nodicincta, A. Ad. Pl. 73, fig. 100.

White, with spiral rows of chestnut spots; whorls angulated above, with longitudinal ribs produced into nodules at the angles; lower part of body-whorl pitted, forming a sort of network between the pits. Length, ·75–1 inch. *Philippines.*

I think this will prove to be a variety of the foregoing species.

P. mitralis, A. Ad. Pl. 73, figs. 94, 97, 2, 3.

Whitish, clouded and indistinctly banded with pale brown; whorls rather convex, longitudinally ribbed, slightly angulated at the suture, interstices spirally striated. Length, 15–18 mill.

Philippines, Taheiti; Mauritius, Red Sea.

P. propinqua, A. Ad. (fig. 97), P. variegata, A. Ad. (fig. 3), and P. magnifica, Ads. and Reeve (fig. 2), appear to be synonyms.

P. glans, Reeve. Pl. 73, fig. 98.

White, with a narrow chocolate band above and below the suture, the lower half of the body-whorl chocolate colored, longitudinally closely ribbed, the interstices spirally striated.

Length, 12 mill. *Philippines.*

Possibly only a variety of the foregoing species.

P. nitida, A. Ad. Pl. 73, fig. 99.

Oral, shining, white, sometimes marbled with pale chestnut; longitudinally flatly ribbed, interstices pitted. Length, 7·5 mill.

Philippines, Viti Is.

P. corrugata, Lam. Pl. 73, fig. 4.

White, with small sparse yellow spots near the suture, longitudinally plicate, the interstices spirally striated; columella three-plaited. Length, 23 mill.

Isle of France (Coll. Lamarck).

A doubtful species; looks like a fossil.

Subgenus Syrnola, A. Adams, 1860.

P. elegans, A. Ad. Pl. 73, fig. 7.

Subperforate, longitudinally and spirally striate, apex very acute; fulvous, with a chestnut line on the periphery and suture; suture channeled; whorls flat, periphery obtusely angulated.

Length, 9 mill.

Singapore.

P. brunnea, A. Ad. Pl. 73, figs. 9, 8.

Solid, narrow, yellowish brown; whorls 15, flatly convex, aperture ribbed within. Length, 15 mill.

Japan.

This species is figured twice in the Conch. Iconica, first under the above name, and again as *P. fulva*, Sowb. (fig. 8), with *brunnea*, A. Ad., as a synonym; Mr. Sowerby being under the impression that his figures represent different species, and that Mr. Adams had described them both as *brunnea*, whereas the latter only described *brunnea* once.

P. attenuata, A. Ad. Pl. 73, fig. 5.

Slender, whitish, shining, finely spirally striated; whorls flattened, suture profound. Length, 11·5 mill.

Ins. Bohol, Philippines.

P. Adamsi, Tryon. Pl. 73, fig. 6.

Subulate, polished, smooth, orange-brown; whorls numerous, flatly convex, suture deep; lip lirate within. Length, 10·5 mill.

Ins. Bohol, Philippines.

For *Obeliscus aclis*, A. Ad. Preoccupied by himself in section Mormula.

P. aciculata, A. Ad. Pl. 73, figs. 10, 11.

Slender, fulvous white; whorls numerous, convex, flattened in the middle, longitudinally substriate, suture deep.

Length, 12·5 mill.

Ins. Cagayan, Philippines (Cuming); *Viti Is.* (Garrett).

Described as an Obeliscus, and afterwards placed in Syrnola. Sowerby, who includes both in his Pyramidella, apparently supposes them to be distinct species, and changes the name of the one to *P. denticulata* (fig. 11). If his much enlarged figure is accurate, this is probably a distinct species.

P. CROCATA, A. Ad. Pl. 73, fig. 12.

Solid, smooth, yellowish brown; whorls rather flat, suture impressed, periphery rounded. Length, 4 mill.

Japan.

P. GRACILLIMA, A. Ad. Pl. 73, fig. 13.

Slender, yellowish white; whorls flat, the last obtusely angular at the periphery. Length, 4 mill.

Japan.

P. CINCTELLA, A. Ad. Pl. 73, fig. 14.

Smooth, white, with a chestnut line at the periphery and above the suture; whorls 9, slopingly, flatly convex. Length, 10 mill.

Japan.

P. STRIATULA, A. Ad. Pl. 73, fig. 15.

Whitish, subpellucid; whorls 8, slopingly convex, spirally striated; aperture lirate within. Length, 6 mill.

Viti Is.

P. ORNATA, Gould. Pl. 73, fig. 16.

Narrowly cylindrical, smooth; yellowish white, with a chestnut line on the periphery and above the suture; whorls numerous, convex. Length, 6 mill. *Coral Sea.*

According to Sowerby *S. columnella*, A. Ad. (unfigured), is a synonym.

P. CYLINDRELLA, A. Ad. Pl. 73, fig. 17.

Narrowly subcylindrical, whitish, with a chestnut line on the periphery, appearing above the suture on the spire; whorls numerous, rather flat, a little swollen near the impressed suture. Length, 4 mill.

Japan.

P. PUPINA, A. Ad. Pl. 73, fig. 19.

Smooth, white, with a spiral chestnut peripheral line, showing above the suture; whorls 9, flatly convex, suture impressed; aperture a little expanded in front. Length, 5 mill. *Japan.*

A little wider than *P. cylindrella.*

P. MODICA, A. Ad. Pl. 73, fig. 20.

Narrowly cylindrical, obtuse, white with pale bands and a chestnut line above the suture; whorls 9, flattened, suture impressed. Length, 4 mill. *Japan.*

Appears to be more narrow than *P. cylindrella.*

P. SEROTINA, A. Ad. Pl. 73, fig. 21.

Narrowly subcylindrical, white, with a chestnut line above the suture and on the periphery; whorls 7, the last long, suture well-impressed; plication far back. Length 3·5 mill.

Japan.

P. MINUTA, H. Adams. Pl. 73, fig. 22.

Subulate, tumid in the middle, rather solid, polished; whitish, with a chestnut line above the suture and at the periphery; suture impressed; whorls 10, flattened; columellar plication conspicuous, transverse. Length, 4 mill.

Orotava, Teneriffe.

Appears precisely like *P. serotina*, except that the plica is stronger.

P. SUBULINA, A. Ad. Pl. 73, fig. 23.

Tapering, pointed, smooth, whitish with a chestnut line above the suture and at the periphery; whorls numerous, slopingly, flatly convex. Length, 4 mill.

Japan.

P. SMITHII, Tryon. Pl. 73, fig. 18.

Narrowly elongated, polished, white; whorls 11, plano-convex, with a diaphanous band below the suture; columella with a small plait. Length, 6·5 mill.

Whydah, W. Africa.

Described by Mr. E. A. Smith as *S. gracillima*, preoccupied by A. Adams.

P. TINCTA, Angas. Pl. 73, fig. 24.

Rather solid, smooth, shining, whitish, irregularly banded and marked with brown; whorls $10\frac{1}{2}$, flatly convex, suture deep; columellar plait rather prominent. Length, 6 mill.

Port Jackson, Australia.

P. SOLIDULA, Dkr. Pl. 73, fig. 26.

Rather solid, yellowish white; whorls 7, somewhat flattened; lip lirate within, columella short with a strong plica. Length, 5 mill. *Japan.*

Var. FASCIATA, Jickeli.

Upper whorls with a single chestnut line, two lines on the penultimate and three on the body whorl.

Red Sea.

P. HYALINA, Dkr. Pl. 73, fig. 25.

Whitish, hyaline, smooth, polished; whorls somewhat convex, suture deep; lip quadrilirate within, columella uniplicate and sinuate above. Length, 5·5 mill.

Japan.

Unfigured and Undetermined Syrnolæ.

P. BUXEA, Gould. *Japan.*
P. BIFASCIATA, Woods. *Tasmania.*
P. BIZONALIS, P. DÆDALA, P. LACTEA, P. MERA, P. PISTILLUM, P. TERETIUSCULA, all of A. Adams. *Japan.*
P. SUBULA, Gould. *China Sea.*
P. LUCIDA, A. Ad. *Red Sea.*
P. TENUISCULPTA, Lischke (figure inaccessible to me). *Japan.*

Section AGATHA, A. Ad., 1860.

P. AUSTRALIS, Angas. Pl. 74, fig. 27.

Acuminately ovate, rather thin, opaque, whitish; whorls 8, slightly convex, suture a little channeled; columella with a strong spiral plait. Length, 8 mill.

Port Jackson, Australia.

Section AMATHIS, A. Ad., 1861.

P. VIRGO, A. Adams (unfigured). *Korea Strait;* 46 fms.

The following species are added by Mr. Adams, all of them unfigured and from Japan:

P. PRODUCTA (Odostomia) and P. PELLUCIDA, P. EBURNEA and P. CONCINNA, described as Menestho.

Section OSCILLA, A. Ad., 1867.

P. ANNULATA, A. Adams. Pl. 74, fig. 28.

Whitish; whorls numerous, flattened, spirally ribbed, the interstices longitudinally striated; columella with a single posterior plication, lip subcrenulated, interior lirate.

Length, 5 mill.

Philippines; Singapore; Japan.

P. LIGATA, Angas. Pl. 74, fig. 29.

Rather thin, rosy-white, spiral ribs prominent; whorls 6; outer lip simple, columella with a small transverse plait.

Length, 2 mill.

——— *Botany Bay, Australia.*

Unfigured Species.

P. LIRATA, P. SULCATA, P. CINGULATA, P. CIRCINATA, all of A. Adams. *Japan.*

P. ZIZIPHINA, P. EXARATA, Carp. *Mazatlan.*

Section ORINA, A. Ad., 1870.

P. PINGUICULA, A. Ad. (unfigured). *Gulf of Suez.*

P. PYRAMIDALIS (Syrnola), A. Ad. (unfigured). *Japan.*

Section ELUSA, A. Ad., 1861.

P. SUBULATA, A. Ad. Pl. 74, fig. 30.

Umbilicated, apex mucronate, smooth, pellucid, whitish, somewhat shining; whorls plano-convex, strongly longitudinally costate, interstices punctate; columella uniplicate in the middle, aperture produced and subchanneled below. Length, 9·5 mill.

Philippines; Japan; Red Sea.

P. GRACILIS, A. Ad. Pl. 74, fig. 31.

Whitish, shining, with a chestnut line above the suture, and on the periphery of the last whorl; whorls flattened, distantly longitudinally costate, interstices smooth. Length, 9 mill.

Philippines; Japan; Red Sea.

P. RUPPELLI, Jickeli. Pl. 74, fig. 32.

Subrimate, rather solid, white, a little shining, longitudinally elegantly plicate, lightly impressly spirally striate; whorls 11, planulate, scarcely submargined above; lip slightly sinuate above, columella callously thickened. Length, 12 mill.

Red Sea.

P. METULA, A. Ad. Pl. 74, fig. 33.

Whitish, apex a little obtuse; whorls 10, planulate, closely regularly longitudinally ribbed, the interstices spirally striate; lip and columella thickened, the latter with a median plica.

Length, 13 mill. *Philippines.*

P. KREBSII, Mörch. Pl. 75, fig. 13.

Yellowish or brownish, shining, closely costate, and spirally punctate in the interspaces, the costæ becoming broader at the suture, and evanescent on the last whorl, suture with a wide ash-colored band; aperture Clausiliform, constricted above, inner lip thick, the columellar plication oblique, wide.

St. Thomas, W. I.

Var. PINGUIS, Mörch.

Shell more solid, with more strongly marked costæ.

P. ELEGANS, d'Orb. Pl. 76, fig. 14.

Thin, white, longitudinally costate; whorls 9, subscalariform, angularly convex and spirally striate below, suture crenate, columella uniplicate. Length, 3·5 mill.

Cuba.

Unfigured Species of Section Elusa.

P. CASTANEA, P. BADIA, P. STRIGULATA, P. CINNAMOMEA, P. TERES, all of A. Adams. *Japan.*

P. ERYTHROSCLERA, Mörch. *St. Thomas, W. I.*

Subgenus CHRYSALLIDA, Carp., 1857.

All the typical species, with one exception, occur on the west coast of Mexico, Panama, and in the seas of Japan; they have been described by Carpenter, C. B. Adams and Arthur Adams, and none of them are figured.

C. TELESCOPIUM, C. REIGENI, C. ANGUSTA, C. CREBRISTRIATA, C. EFFUSA, C. FASCIATA, C. INDENTATA, C. OVULUM, all of Carpenter. *Mazatlan, etc.*

C. PUMILA, Carpenter. *California.*

C. MARGINATA, C. COMMUNIS, C. PAUPERCULA, C. B. Adams. *Panama.*

C. CURTINA, Gould. *So. Carolina.*

C. FILOCINCTA, C. ERUCELLA, C. RUFOLINEATA, C. GALBULA, C. METULA, C. PLICATA, C. GEMMA, C. COSTELLATA, C. MUNDULA, C. TENUICULA, C. INCONSPICUA, C. TEREBRA, C. NANA, C. MUMIA, C. MUNDA, C. ALVEATA, C. CONSOBRINA, C. CONSIMILIS, C. PUPULA, all of A. Adams. *Japan.*

Section MORMULA, A. Adams, 1863.

P. ACLIS, A. Ad. Pl. 74, fig. 34.

White, shining; whorls 8, somewhat flattened, longitudinally plicate, the interstices smooth; lip dilated, columella somewhat thickened. Length, 7 mill. *Philippines.*

P. ELONGATA, Pease. Pl. 74, fig. 35.

Longitudinally closely ribbed, spirally striate; whorls 14, convex, with a simple varix on each whorl, suture well impressed; columella twisted below, lip widely varicose on its outer edge, strongly lirate within. Length, 19 mill.

Paumotus (Pease); *Viti Is.* (Garrett).

P. GRANDIS, Ads. and Reeve. Pl. 74, fig. 36.

Longitudinally costate, the last whorl smooth below, white. Length, 15 mill. *Eastern Seas.*

P. VARICOSA, A. Ad. Pl. 74, fig. 35 *a*.

Light-brownish, with pale chestnut bands; whorls flattened, varicose, closely longitudinally costate, crossed by spiral liræ, the interstices with spiral raised lines. Length, 1 inch.

Eastern Seas.

P. CORNELLIANA, Newcomb. Pl. 74, fig. 37.

Solid, white, shining, lightly longitudinally costate, and spirally striate; whorls 8, rounded, the 4th and 7th with an obscure varix; lip thickened, indistinctly bilabiate. Length, 10 mill.

Honolulu, Sandwich Is.

Unfigured and Undetermined Species.

P. AMBIGUA, Gould. = *Rissoina.*
P. EGREGIA, A. Adams. *Philippines.*
P. MACANDRÆA, A. Adams. *Gulf of Suez.*
P. RISSOINA, A. Adams. *Japan.*

Section STYLOPTYGMA, A. Ad., 1860.

P. TYPICA, Tryon. Pl. 74, fig. 38.

White, shining, subpellucid, spirally striate; whorls flattened, the last with a central sulcus, apex suddenly acuminated; columella posteriorly uniplicate. Length, 8 mill.

Ins. Bohol, Philippines.

The name is substituted for *P. stylina*, A. Ad., preoccupied.

P. AURANTIACA, Angas. Pl. 74, fig. 40.

Rather thin, shining, fulvous orange, with a pale band at the suture, darker on the lower whorls, fading into white towards the apex; whorls 8, finely transversely striated; lip-fold very small, rudimentary. Length, 6 mill.

Port Jackson, Australia.

Unfigured Species.

P. CLAUSILIFORMIS, Carpenter. *Mazatlan.*

P. PUPIFORME, P. SUBULIFORME, P. CEREUM, P. GIBBUM, P. LARVULA, all of A. Adams. *Japan.*

P. LENDIX, A. Adams. *Japan, Gulf of Suez.*

P. NIVEA, A. Adams. *Gulf of Suez.*

Subgenus ACTÆOPYRAMIS, Fischer, 1885.

P. STRIATA, Gray. Pl. 74, fig. 39.

Solid, olivaceous, deeply, distantly, spirally sulcate; aperture white. Length, 1 inch.

Philippines.

P. FULVA, A. Ad. Pl. 74, fig. 42.

Slender, solid, fulvous, spirally sulcate; whorls flattened, suture deep; aperture brown. Length, 1 inch.

Philippines.

P. GRANULATA, A. Ad. Pl. 74, fig. 43.

White, solid; whorls rather flat, gradate, longitudinally corrugately plicate, spirally, deeply, distantly grooved; columellar fold prominent. Length, 6 mill.

Philippines.

P. LAUTA, A. Ad. Pl. 74, fig. 44.

Thin, somewhat pellucid, whitish; whorls flattened, longitudinally striated, spirally, distantly grooved. Length, 7 mill.

Philippines.

P. AMŒNA, A. Ad. Pl. 74, fig. 41.

Thin, rather pellucid, white, substriated longitudinally, spirally distantly sulcated, interstices elegantly punctate.

Length, 9 mill.

Philippines.

P. CASTA, A. Ad. Pl. 74, fig. 45.

White, thin, semipellucid; whorls rather convex, spirally rather closely grooved, interstices beautifully striated; columella oblique, somewhat tortuous. Length, 11 mill.

China Sea.

P. SPECIOSA, A. Ad. Pl. 74, fig. 46.

White, thin, semipellucid; whorls 8, rather convex, with elevated spiral ridges, the interstices longitudinally striated; columella nearly straight, with an oblique faint plication.

Length, 9 mill.

Philippines.

P. STYLINA, A. Ad. Pl. 74, fig. 47.

White, subpellucid, middle whorls somewhat enlarged, a little flattened, thinly spirally striated, substriated longitudinally.

Length, 8·5 mill.

Philippines.

P. SUTURALIS, A. Ad. Pl. 74, fig. 48.

Subumbilicated, white, shining, subdiaphanous; whorls 7, flattened, suture channeled, spirally sulcate, last whorl subsolute, with white articulated bands; columellar plication evanescent.

Length, 8 mill.

Philippines.

P. CONCINNA, A. Ad. Pl. 74, fig. 50.

Grayish white; whorls 6, rather flattened, spirally grooved, interstices microscopically crenulated; columellar plait oblique, somewhat obsolete, lip lirate within. Length, 9 mill.

Moreton Bay, Australia.

P. PURA, A. Ad. Pl. 74, fig. 49.

Rather solid, white; whorls somewhat convex, spirally grooved, intermediate liræ smooth, grooves longitudinally striated.

Length, 9 mill.

New Zealand.

P. PUNCTURATA, E. A. Smith. Pl. 78, fig. 52 *a*.

Subpellucid, brownish white; whorls 4, spirally punctate-sulcate; columella obliquely twisted. Length, 5 mill.

Whydah, W. Africa.

Unfigured Species.

P. EXIMIUM, Lischke (figure inaccessible to me). *Japan.*

P. CLATHRATULA, Mörch. *St. Thomas, W. I.*

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P. CŒLATA, P. SULCIFERA, P. PUNCTIGERA, P. METULA, P. VITTATA, all of A. Adams. *Japan.*

P. TENELLA, A. Adams. *Philippines.*

P. PUNCTICULATA, P. SINUATA, Gould. *China Seas.*

P. ACUMINATA, Gould. *Japan.*

Section MUMIOLA, A. Ad., 1863.

P. SPIRATA, A. Ad. Pl. 74, figs. 52–54.

White, under a yellowish or brownish epidermis, longitudinally plicate, transversely grooved, suture channeled; whorls 8, gradate; columella with an oblique fold. Length, 7 mill.

Philippines.

P. CINCTA, Carpenter. Pl. 74, fig. 51.

White; whorls somewhat rounded, with deep suture, spirally costate, decussated by longitudinal riblets, most apparent near the suture. Length, 3 mill.

Southern California.

Figured from a specimen.

Unfigured Species.

P. TESSELLATA, P. RETICOSA, A. Adams. *Japan.*

P. OVATA, P. ROTUNDATA, P. OBLONGA, P. NODOSA, all of Carpenter. *Mazatlan.*

Section CARELIOPSIS, Mörch, 1874.

P. STYLIFORMIS, Mörch. (Unfigured.) *West Indies.*

Genus SYRNOLOPSIS, E. A. Smith, 1880.

S. LACUSTRIS, Smith. Pl. 74, figs. 55, 56.

Smooth, glossy, imperforate, yellowish horn-color, banded with white beneath the suture; whorls 12, flattened, finely striated by flexuous growth-lines, sometimes showing traces of spiral striæ; columella strongly plaited above; outer lip with one or two lamellæ, far within.

Lake Tanganyika, E. Africa.

Bourguignat, who describes (but without figures) several new species, divides them into two groups, the first having two

lamellæ, the second a single one. In consequence of this division, the above species is placed among those having two lamellæ, and the figure of it given by Mr. Crosse (fig. 56) is made a new species under the name of *S. Grandidieri*, because of having only one lamella. I do not believe the distinction will hold good, as these plicæ are either developed or entirely absent in the same species in Pyramidellidæ.

Unfigured Species.

S. Hamyana, S. Anceyana, S. Giraudi, S. minuta, all of Bourguignat. *Lake Tanganyika.*

Family *TURBONILLIDÆ.*

Shell minute, white, slender, elongated, many-whorled, usually longitudinally or spirally sculptured; columella without plications or with a single small fold; apex sinistral.

Animal as in Pyramidellidæ. Operculum corneous, paucispiral.

The species are very small, and mostly more slender than in Pyramidellidæ; they are numerous, and have been separated into a number of inferior groups, which are, for the most part, poorly defined—so that their classification is difficult and uncertain. As most of these groups are founded on European species, I have not, as a rule, included any extra-limital forms, preferring for my purposes a geographical division of the species. Hitherto the species have neither been monographed nor catalogued.

Synopsis of Genera.

Genus TURBONILLA, Risso, 1826.

Shell slender, elongated, many whorled, generally costulate, apex sinistral, columella vertical, not plicate. Operculum horny, subspiral, the columellar margin entire, face with a spiral groove.

Animal with wide tentacles, mentum elongated, flattened, usually bilobed in front; foot large, anteriorly auriculated.

Comprises a great number of small, graceful, usually white shells; distribution universal. Fossil, tertiary. The synonyms are *Chemnitzia*, d'Orb., 1839, not 1850; *Pyrgiscus*, Philippi, 1841; *Orthostelis*, Aradas.

Section Tragula, Monts., 1884.

Sculpture fenestrate; spire elevated, acute, apex twisted; whorls scalariform; columella without fold or tooth. T. fenestrata, Forbes.

Section Trabecula, Monts., 1884.

Whorls rounded, longitudinally lamellose; aperture semicircular, with an exterior rib; no apparent spiral sculpture; apex

retrorse; columella without fold or tooth. T. JEFFREYSIANA, Seguenza.

Section PYRGISCULUS, Monts., 1884.

Whorls scalariform, lamellarly ribbed, peculiarly spirally sculptured; aperture tetragonal, no columellar tooth. T. SCALARIS, Phil.

Section PYRGOLIDIUM, Monts., 1884.

Rather stout, with one or more intercostal nodes in the centre of each whorl; no columellar fold; apex inclined to the right. T. ROSEA, Monts.

Section PYRGOSTELIS, Monts., 1884.

With longitudinal ribs, crossed by spiral striæ, forming pittings; color fulvous or banded; columella with a re-entering fold. T. RUFA, Phil.

Section PYRGOSTYLUS, Monts., 1884.

Shell varicose, the columella dentate. T. STRIATULA, Linn.

Subgenus DUNKERIA, Carpenter, 1857.

Whorls rounded, cancellated. T. PAUCILIRATA, Carp.

Section CINGULINA, A. Adams, 1860.

Shell turriculated, subulate; whorls numerous, spirally ribbed, the interstices striate, aperture oblong, entire in front, columella straight, simple, lip sharp, arcuate. C. CIRCINATA, A. Ad.; *Salassia*, de Folin, 1870, is a synonym.

Genus LIA, de Folin, 1872.

Shell oval conic, spire whorls decussated, lip undulated by the spiral sculpture—which appears on the columella, simulating two plications. L. DECORATA, Folin.

A doubtful group, possibly described from a young specimen.

Genus MURCHISONIELLA, Mörch, 1875.

Shell small, elongate, thin, pellucid, many-whorled, the apex heterostrophe; lip profoundly sinuous; whorls subangular on the periphery, and having two spiral lines which define a sort

of sinus-band. M. SPECTRUM, Mörch. *West Indies.* A fossil form from the Parisian eocene is referred to the genus.

Genus VANESIA, A. Adams, 1861.

Shell melaniform, decussated by longitudinal and spiral ridges, subperforate, thin; whorls very little rounded; aperture oval, rounded in front, entire, lip sharp. V. TRIFASCIATA, A. Ad. *China.*

Resembles a Melania, but is a true marine shell; the character of the apex and the animal are unknown, and the classification is provisional.

Genus EULIMELLA, Forbes, 1846.

Shell elongated, turriculate, solid, smooth, polished; whorls numerous, apex sinistral; aperture subquadrangular, lip not continuous, columella straight, without plications.

Animal with short tentacles; mentum lobed in front; anterior extremity of foot truncated.

Section BAUDONIA, Bayan, 1873.

Shell aciculate, very long; whorls numerous, convex; aperture small, subquadrangular, columella a little sinuous. Recent and fossil. E. GRACILIS, Desh. Eocene of Paris basin. The synonyms are *Aciculina*, Desh., 1862; *Raphium*, Bayan, 1873; *Anisocycla*, Monts., 1880.

This section may well be merged in the typical group.

Section OCEANIDA, Folin, 1870.

Shell conical, elongated. E. GRADUATA, Folin. *West Indies.* I know nothing of this section.

Section LIOSTOMIA, O. Sars, 1878.

Shell relatively shorter, resembling Odostomia, subperforate; aperture oval. L. CLAVULA, Lovén.

Section MICROBELISCUS, Sandberger, 1874.

Shell cylindrically subulate; whorls but slightly convex; aperture rounded oval, columella arcuate. E. INASPECTA, Fuchs. L. Pliocene, *Hungary.*

Section STYLOPSIS, A. Adams, 1860.

Shell subulate, opaque, smooth, not polished; whorls flattened,

suture well-impressed; aperture subquadrangular, columella straight, simple, lip subangular in front. E. TYPICA, A. Adams. *Corea.*

Subgenus MENESTHO, Möller, 1842.

Shell turriculated, with spiral striæ, or decussated; aperture oval. M. ALBULA, Fabr. *Boreal Seas.*

Pyramis, of Couthouy, 1839 (non Schumacker, 1817), is a synonym.

Genus ODOSTOMIA, Fleming, 1828.

Shell small, perforate, oval, conoidal or turriculated; columella with a feeble, oblique, more or less marked tooth; aperture oval or subrhomboidal, peristome not continuous. Operculum horny, lamellar, subimbricated, with a median spiral groove, inner margin indented.

Animal elongated, the head large and robust, bearing two conical tentacles, with eyes at their bases, foot depressed, truncated in front; mentum anteriorly bilobed.

Very minute, usually smooth shells, having the habit of Rissoæ, and, like them, sometimes found in brackish water. The species are numerous, of universal distribution, from low-water to 40 fathoms. Fossil, eocene. O. PLICATA, Montagu. *Europe.*

The synonyms are *Odontostoma*, Turton, 1829; *Odontostomia*, Jeffreys, 1837.

The sections will only be used for the division of the European species on which they were founded; those of other localities will be described simply as Odostomiæ.

Section ODOSTOMIA, *sensu stricto.*

Whorls smooth; lip not grooved within, columellar tooth well marked. O. PLICATA, Mont.

Brachystomia, Monts., 1884, is a synonym.

Section MEGASTOMIA, Monts., 1884.

Shell smooth; aperture large, lip finely grooved within. O. CONSPICUA, Alder.

Section ONDINA, Folin, 1870.

Shell oval, thin; whorls smooth or spirally striated, columellar tooth obsolete. O. OBLIQUA, Alder.

Generally known as *Auriculina*, Gray, 1847, a name preoccupied by Grateloup, 1838.

Section Doliella, Monts., 1880.

Shell Doliiform, smooth, apex immersed; peristome continuous; columellar tooth feeble. O. nitens, Jeffreys.

Section Auristomia, Monts., 1884.

Shell smooth, aperture large, auriculate. O. Erjaveciana, Brusina.

Section Evalea, A. Adams, 1860.

Shell ventricose, spirally ornamented; columella plicate. O. elegans, A. Adams. *Odetta*, Folin, 1870, is a synonym.

Section Polyspirella, Carpenter, 1861.

Whorls with spiral ribs, the interstices thinly clathrate, columella scarcely folded. O. trachealis, Gould.

Section Pyrgulina, A. Adams, 1863.

Conoidal, longitudinally ribbed, crossed by spiral striæ, columella feebly plicate. O. decussata, Montagu. The synonyms are *Parthenia*, Lowe (in part); *Nœmia*, Folin, 1870; *Parthenina*, Buc., Dautz. et Dollf., 1883.

Section Odostomiella, Buc., Dautz., Dollf., 1883.

Shell pupoidal, longitudinally ribbed; columella plicate. O. doliolum, Phil.

Section Elodia, Folin, 1870.

Shell conical, longitudinally ribbed; columella plicate. O. Hortensiæ, Nansouty.

Section Spiroclimax, Mörch, 1874.

Shell subcylindrical; whorls scalariform; aperture somewhat ear-shaped, lip sigmoid; columella scarcely plicate. O. scalaris, Mörch.

Section Miralda, A. Ad., 1863.

Solid, ovate or elongated; whorls flat, plicate posteriorly, spirally lirate anteriorly; lip subangulate behind, margin crenate. O. diadema, A. Ad. Several Japanese species.

Genus TURBONILLA, Risso, 1826.

I. *European and West African Species.*

Typical.

T. LACTEA, Linn. Pl. 74, fig. 57; Pl. 75, fig. 77.

White, rather solid, opaque, glossy, strongly longitudinally ribbed, ribs terminating below the periphery of the last whorl; whorls 12, moderately enlarging, slightly convex; columella usually without fold. Length, 8·5 mill.

Europe.

It is *T. elegantissima*, Macg.; *T. acuta*, Donovan; *T. alba*, Penn.; *T. plicatula*, Risso; *T. turritella*, Scacchi, and *T. gracilis*, Desh.

Var. CAMPANELLÆ, Phil. Fig. 77.

Whorls more flattened, costæ more oblique.

Sicily.

T. elegantissima, var. *similis*, Monts., is a synonym.

T. SINUOSA, Jeffreys. Pl. 75, fig. 84.

Rather thin, semitransparent, glossy, closely longitudinally flexuously ribbed, ribs fading out at the periphery of last whorl, white; whorls 8, flattened; columellar tooth slight but distinct. Length, 4·3 mill.

Mediterranean, W. Coast of Africa.

T. ACUTICOSTATA, Jeffreys. Pl. 75, fig. 85.

Rather thick, opaque, glossy, with longitudinal ribs and wider interspaces, ribs terminated at the periphery of the last whorl by a spiral, thread-like line; whorls 9, rather convex; columella without tooth. Length, 3 mill.

Mediterranean Sea.

T. MAGNIFICA, Seguenza. Pl. 75, fig. 96.

White or pinkish white, often beautifully iridescent; whorls 11–12, somewhat flattened, rounded at the impressed suture, longitudinally ribbed, ribs curved, low and rounded; columella not dentate. Length, 12 mill.

New England, Azores, Bay of Biscay.

First described as a Sicilian tertiary fossil, but found living by the "Travaillieur" and "Talisman" expeditions. Mr. Ver-

rill described it as *T. formosa*, which being preoccupied by Dr. Jeffreys, he subsequently changed to *T. Bushiana.*

T. PUSILLA, Philippi. Pl. 75, fig. 79.

Whorls 9, flattened, with about 16 oblique ribs, spirally striate. Length, 3 mill.

Sicily, Vigo Bay.

T. GRADATA, Monts. Pl. 75, fig. 82.

Rather solid, cylindrical; whorls 9, longitudinally ribbed, with wider interspaces; aperture subquadrangular.

Length, 4·6 mill.

Mediterranean Sea.

Described as a variety of *T. lactea*, Linn. Jeffreys considers it a variety of *T. pusilla*, Phil. *T. limitum*, Folin, is said to be a synonym.

T. INNOVATA, Monts. Pl. 75, fig. 76.

Differs from *T. pusilla*, Phil., in its larger size, straighter ribs and absence of spiral sculpture. Jeffreys described it in his British Conchology under the name of *T. pusilla*, but subsequently doubted its identity with that species, and Monterosato separated it as above. Length, 6·8 mill.

England to Mediterranean Sea.

T. DELICATA, Monts. Pl. 75, fig. 81.

More slender than *T. lactea*, white, shining; whorls 10, flattened, closely longitudinally plicate, interstices smooth.

Length, 3 mill.

Ireland to Mediterranean.

The name is substituted for *T. gracilis*, Phil., non Brocchi.

T. MICANS, Monts. Pl. 75, fig 83.

Thin, semitransparent, very glossy; whorls 7, flattened, with from 18–20 long, sharp, curved longitudinal ribs and equal, smooth interstices. Length, 3 mill.

Gulf of Marseilles; off West Coast of Africa.

This is *T. attenuata*, Jeffreys, not *Odostomia* (*Eulimella*) *attenuata*, Monts.

T. FULGIDULA, Jeffreys. Pl. 75, figs. 86, 87.

Rather solid, subcylindrical, nearly transparent, lustrous; whorls 7, flattened, ribs 15 or 16, narrower than the interspaces,

both crossed by numerous microscopic spiral striæ, ribs fading out at the periphery of the last whorl. Length, 2 mill.

Atlantic Ocean.

T. COMPRESSA, Jeffreys. Pl. 75, fig. 88.

Cylindrical, a little compressed in the middle of each whorl, thick, semitransparent, glossy; whorls 11, with about 25 longitudinal ribs and subequal interspaces; color white, a young specimen having a broad, obscure chestnut-colored band.

Length, 6·25 mill. *Mediterranean, Azores, Cape Verd Is.*

T. PAUCISTRIATA, Jeffreys. Pl. 75, fig. 90.

Rather thick, semitransparent, lustrous; whorls 9, flatly convex, with about 20 straight, slight, irregular longitudinal ribs, fading out on the body-whorl. Length, 6·8 mill.

Mediterranean; W. Coast of Africa; Culebra, Danish West Indies.

Dr. Jeffreys was somewhat doubtful of the distinctness of this shell from *T. compressa.*

T. SEMICOSTATA, Jeffreys. Pl. 75, fig. 89.

Rather thick, semitransparent, glossy; whorls 9, flattened in the middle, with a few slight longitudinal ribs, sometimes covering the upper whorls only, but in most disposed irregularly over the shell; in one specimen the whole surface is microscopically spirally striated. Length, 3·75 mill.

Cape Breton, Gulf of Gascony.

T. MACANDREÆ, H. Adams. Pl. 74, fig. 59.

Solid, whitish or light fulvous; whorls 16, slopingly flattened, with numerous rounded ribs, fading at the periphery, and equal smooth interspaces. Length, 18–24 mill. *Vigo.*

Described by Mr. Adams as *T. speciosa*, preoccupied.

T. OBLIQUATA, Phil. Pl. 75, fig. 80.

Hyaline; whorls 9, convex, with about 14 oblique small ribs and much wider, smooth interspaces. Length, 3 mill.

Mediterranean Sea.

Unfigured Species.

T. ACUTISSIMA, Monts. *Mediterranean.*

T. ROSEA, T. MULLERI, T. SENEGALENSIS, Maltzan.

Ins. Gorée, W. Africa.

Section Tragula, Monts., 1884.

T. fenestrata, Forbes. Pl. 74, figs. 58, 60, 61.

Rather solid, almost opaque, glossy; whorls 8–9, shelving, with about twenty longitudinal ribs, crossed by fine spiral lines, ribs terminating at the periphery where there are two strong spiral ridges, appearing on the spire-whorls, white or yellowish white. Length, 3·75 mill.

Europe.

It is *T. Weinkauffi*, Dunker (fig. 61).

T. Jeffreysiana, Seguenza (unfigured). *Mediterranean.*

It is *T. clathrata*, var. *Jeffreysiana*, Monts.

Section Pyrgisculus, Monts., 1884.

T. scalaris, Phil. Pl. 75, fig. 78; Pl. 74, fig. 65.

Shell moderately solid, opaque, rather glossy; whorls 9, narrowly shouldered, pale yellowish or cream-color, with frequently two or three faint tawny bands on the last whorl; longitudinally ribbed, with wider interspaces, not reaching the base of the body-whorl, interspaces spirally striate, the striæ often arranged in pairs. Length, 6·25 mill.

Europe.

T. rufescens, Forbes. Pl. 74, figs. 62–64.

Whorls convex, flexuously ribbed, with subequal, spirally striate interspaces; yellowish brown, with two or three chestnut bands. Length, 6·25 mill.

Europe.

Dr. Jeffreys considered this a variety of *T. scalaris*, Phil. He also places here *T. indistincta*, Fleming.

T. formosa, Jeffreys. Pl. 74, fig. 66.

Narrowly elongated; whorls 13, narrowly shouldered, making a channeled suture, with straight longitudinal ribs and somewhat wider interspaces, which are spirally costulate, a peripheral ridge terminates the longitudinal ribs on the body-whorl.

Length, 8 mill.

? Shellness, Kent, England.

Dr. Jeffreys suspects that this shell is exotic.

T. INDISTINCTA, Montagu. Pl. 74, figs. 73, 74.

Whorls 8, rounded, with deep suture, white, flexuously costate, with fine spiral striæ in the interstices. Length, 4 mill.

Europe, Canary Is.

The synonyms are *T. areolata*, Rayneval; *T. Juliæ*, de Folin; *T. nanodea*, Monts.; *T. curvicostata*, S. Wood; *Rissoa Balliæ*, Thompson; *T. speciosa*, Bean.

Section PYRGOLIDIUM, Monts., 1884.

T. ROSEA, Monts.

Shell rosy; whorls flattened with straight narrow ribs, becoming evanescent at the periphery of the last whorl, interspaces much wider, with two spiral series of nodules. Length, 6 mill.

Mediterranean Sea.

It is *T. internodulosa* of Monterosato, not Searles Wood.

T. CALAMELI, Jousseaume (unfigured). *Algiers.*

Closely allied to, and perhaps = *T. rosea.*

Section PYRGOSTELIS, Monts., 1884.

T. RUFA, Phil. Pl. 74, figs. 68–70; Pl. 75, fig. 91.

Moderately solid, opaque, glossy, with 20–30 longitudinal, narrow and shallow ribs, evanescent at the periphery, the interstices crossed and base encircled by rather broad impressed lines; pale fawn-colored or tawny, frequently with a narrow chestnut band above the periphery. Length, 8·75 mill.

Europe.

T. crenata, Lowe; *T. scalarioides*, Risso; *T. simillimus*, Mont. Dr. Jeffreys (Zool. Proc., 356, 1884) thought *T. interrupta*, Totten, identical and that it ought to be adopted, being a prior name; he also thought *T. Rathbuni*, Verrill and Smith, the same.

Var. FULVOCINCTA, Thompson. Figs. 69–70.

Shell thinner, more slender, base narrower, whorls not so much compressed, band always present and more conspicuous.

Var. DENSECOSTATA, Phil. Fig. 91.

Whorls 9, very slightly convex, with numerous smooth, straight longitudinal ribs, wider than the interstices.

Mediterranean Sea.

Var. *exigua*, Monts., is a synonym.

T. COSTIFERA, E. A. Smith. Pl. 75, fig. 92.

Light fulvous; whorls 8, rather flattened, longitudinally costate, the interstices finely spirally striate, with a diaphanous band below the suture; columella uniplicate. Length, 5·5 mill.

Whydah, W. Africa.

T. SPECTABILIS, Monts. (unfigured). *Mediterranean.*

T. CLATHRATA, Jeffreys. Pl. 74, figs. 71, 72.

Shell solid, opaque, shining; whorls 7, convex, with about 20 strong flexuous longitudinal ribs, extending to the base of the body-whorl, with equal interstices, which are crossed by two strong spiral interrupted riblets (three on the last whorl); color whitish or pale reddish brown; columella without tooth.

Length, 4 mill. *Great Britain.*

T. SIGMOIDEA, Monts. Pl. 75, figs. 93, 94.

Rather thin, semitransparent, glossy; whorls 8, flattened, with about 25 very flexuous oblique ribs, the wider interstices spirally striate. Length, 3·75 mill. *Algiers, Palermo.*

T. FLEXUOSA, Jeffreys. Pl. 75, fig. 95.

Rather thin, semitransparent, glossy; whorls 5, flattened, with 15–20 sharp, flexuous longitudinal ribs, abrupt or subnodose at the suture, almost disappearing at the periphery where they are crossed by a few spiral striæ. Length, 2·5 mill.

Mediterranean Sea.

Section PYRGOSTYLUS, Monts., 1884.

T. STRIATULA, Linn. Pl. 74, fig. 75.

Shell thin, pale brown, with three darker bands, closely longitudinally ribbed, with much narrower interspaces, both crossed by distant spiral striæ, of which there are four on the spire-whorls; whorls (normal) 9, rounded, with well impressed suture.

Length, 9 mill. *Mediterranean.*

The synonyms include *T. striolata*, Weink.; *T. varicosa*, Forbes; *T. potamoides*, Cantraine; *T. pallida*, Phil.

T. CANDIDA, T. RUGOSA, Folin. *West Africa.*

The work in which these are described and figured is not accessible.

II. *Species of East Coast of the United States and West Indies.*

T. EMERTONI, Verrill. Pl. 75, fig. 6.

White, lustrous; whorls 11, not very oblique, broadly rounded, a little flattened on the sides, suture strongly impressed; surface with slight, rather indistinct and irregular longitudinal furrows, which are often absent.

Length, 4·8 mill.

Martha's Vineyard.

Smaller than *T. nivea*, Stimp., with a larger nucleus and less distinctly ribbed.

T. NIVEA, Stimpson. Pl. 75, fig. 11.

White, shining; whorls 11, flattened, longitudinally straightly ribbed; the interstices smooth, nucleus small, prominently upturned. Length, 7 mill.

Maine, northwards.

T. RATHBUNI, Verrill and Smith. Pl. 75, fig. 5.

White; whorls 12, rather convex, suture impressed; whorls rather flattened, crossed by about 30, smooth, even, longitudinal ribs, intervals as wide, showing eight or ten spiral striæ.

Length, 13 mill.

New England, deep water.

Dr. Jeffreys considered this to = *T. rufa*, Phil., of Europe.

T. ELEGANS, Verrill. Pl. 75, fig. 8.

Light yellowish; whorls 10 or more, well-rounded, not distinctly flattened, with rather deep suture; surface lustrous, with numerous rounded longitudinal ribs, narrower than the concave interspaces, fading out below the middle of the last whorl, and with numerous revolving grooves, interrupted by the costæ, but continuous on the lower part of the body-whorl; sometimes there is a darker band on the middle of the last whorls and the revolving striæ are darker.

Narragansett Bay, Vineyard Sound, Long Island Sound.

T. AREOLATA, Verrill. Pl. 75, fig. 9.

Whorls 8 or 10, moderately convex, somewhat flattened in the middle, crossed by about 25 longitudinal ribs, the interstices with rather conspicuous impressed spiral lines, dividing them

into pretty regular, small, squarish pits; body-whorl subangulated below the middle, the base only marked by fine spiral striæ.

Length, 4 mill.

Long Island Sound, Vineyard Sound.

T. COSTULATA, Verrill. Pl. 75, fig. 10.

Translucent, glossy white, faintly banded with pale brown; whorls 6 or more (besides a large apical whorl), flattened, but slightly convex, with about 20 longitudinal ribs and narrower, deep interspaces, the latter crossed by close microscopic revolving striæ, which are continued below the subangulated periphery, the costæ vanishing; bands two on the body, one on the spire-whorls. Length, 4 mill.

Long Island Sound, Vineyard Sound.

T. INTERRUPTA, Totten. Pl. 75, fig. 7.

Whorls 10, almost flat, crossed by 20 to 30 obtuse ribs, the interstices with about 14 subequal revolving lines arranged in pairs, often confounded in one; ribs obsolete below, where the revolving lines are uninterrupted; the whorls are slightly shouldered, making the suture distinct; whitish brown or amber-colored. Length, 6·25 mill.

Mass. to N. Carolina.

Very probably identical with *T. rufa*, Phil., of Europe, over which it has priority of publication.

T. TEXTILIS, Kurtz. Pl. 75, fig. 12.

Whorls 6 or 7, shouldered, with close, prominent, smooth, longitudinal ribs, the interspaces crossed by impressed revolving lines; white, waxy or chalky. Length, 3 mill.

So. Carolina.

Unfigured Species.

T. SPIRATA, Kurtz and Stimpson. *No. Carolina.*
T. EQUALIS, Say. *Vineyard Sound; Southern Coast.*
T. STRICTA, T. GRANDIS, Verrill. *Long Island Sound.*
T. PERLEPIDA, Verrill. *Chesapeake Bay.*
T. VIRIDARIA, and vars. VIRGA and PUNICEA, Dall. *Cedar Keys, Fla.*

T. ORNATA, d'Orb. Pl. 76, fig. 15.

Thin, white, closely longitudinally ribbed and spirally striate; whorls 10, slightly convex, suture deep, crenulated.

Length, 6 mill.

Cuba.

According to Mörch, *Chemnitzia latior*, C. B. Ad., is a synonym.

T. MODESTA, d'Orb. Pl. 76, fig. 17.

Thin, white, longitudinally ribbed, ribs terminating at a spiral ridge below the periphery of the body-whorl, base smooth, suture deep; whorls 6, moderately convex. Length, 2 mill.

Cuba.

T. PULCHELLA, d'Orb. Pl. 76, fig. 18.

Thin, white, longitudinally costate, the costæ terminating on the body-whorl at a spiral ridge, below which the surface is smooth; whorls 12, moderately convex. Length, 7–8 mill.

West Indies.

Mörch considers *T. levis*, C. B. Ad. (unfigured), a probable variety.

T. PUSILLA, C. B. Ad. Pl. 76, fig. 19.

White, with about 12 strong longitudinal ribs terminating about the periphery of the last whorl; whorls 10–11, besides the nucleus, moderately convex, with well impressed suture.

Length, 3·3 mill.

Jamaica, St. Thomas.

T. TURRIS, d'Orb. Pl. 76, fig. 20.

Thin, white, longitudinally costate, terminating in a peripheral line, below which the base is spirally striate; whorls 14, suture impressed. Length, 7 mill.

St. Thomas, W. I.; Rio, Brazil.

T. SUBSTRIATA, C. B. Adams. Pl. 76, fig. 21.

White, wax-colored next the suture; whorls 8, flattened, with 22 to 24 longitudinal ribs, and very numerous, scarcely perceptible spiral striæ in the interspaces and on the lower part of the body-whorl; on the middle of the whorls is a spiral series of shallow, intercostal pits, suture distinct. Length, 2·75 mill.

Jamaica, St. Thomas.

Mörch remarks: "If d'Orbigny possibly has overlooked the

minute spiral striæ, this species is perhaps the same as the preceding."

T. AMERICANA, d'Orb. Pl. 76, fig. 16.

Thin, white, coarsely longitudinally costate, with intercostal spiral striæ; whorls 9, convex, with a small deep-seated columellar plication. Length, 3 mill.

Rio Janeiro, Brazil to San Blas, Patagonia.

The figure does not show the plication, which must be small and obscure.

T. PUNCTA, C. B. Adams. Pl. 76, fig. 22.

White; whorls 10–11, besides the nucleus, scarcely convex, with distinct suture; white, with about 26–30 rather prominent longitudinal ribs, not produced below the periphery of the last whorl, and numerous crowded intercostal striæ, one of which striæ a little above the middle of the whorls and another along the suture are wide and deep, resembling spiral series of punctures. Length, 5·5 mill.

Jamaica, St. Thomas.

T. SUBULATA, C. B. Adams. Pl. 76, fig. 23.

White, or pale brownish white, with two spiral bands of pale wax-color, and a third on the lower part of the body-whorl; whorls 10, rather convex, with well impressed suture, with 28–30 slender prominent longitudinal ribs, not quite obsolete below the periphery, and very fine spiral striæ between the costæ and anteriorly, the one next the suture larger. Length, 4·25 mill.

Jamaica, St. Thomas.

T. FLAVOCINCTA, C. B. Adams. Pl. 76, fig. 24.

White, with a broad yellowish brown sutural band; whorls 8–9, besides the nucleus, slightly convex below the middle, a little shouldered, with distinct suture; with about 28 rounded, slender ribs, becoming obsolete anteriorly, and very minute spiral striæ intercostal and anterior. Length, 3·5 mill.

Jamaica, St. Thomas, Guadeloupe.

T. FASCIATA, d'Orb. Pl. 76, fig. 25.

Thin, white, with a broad chestnut subcentral band; whorls 9, gradate, with deep suture; longitudinally costate, the ribs

terminating at the periphery, with intercostal spiral striæ continued and becoming stronger on the base. Length, 3 mill.

Rio Janerio, Brazil; San Blas, Patagonia.

T. PUPOIDES, d'Orb. Pl. 76, fig. 26.

Shell strong, white or yellowish brown; whorls 8, flat, with strong, subcontinuous costæ, suture margined, base spirally striate. Length, 3 mill.

Cuba, St. Thomas.

Differs from the preceding species by its margined suture, stronger and more distant ribs and spiral striæ only anteriorly.

T. RIISEI, Mörch. Pl. 76, fig. 27.

Thick, orange colored, with two darker bands, one above the suture, the other median; with about 40 costæ, and very finely spirally striate; columella with an indistinct plication.

Length, 3·5 mill.

St. Thomas.

Figured from the type.

T. DUBIA, d'Orb. Pl. 76, fig. 28.

Thin, whitish or fulvous with a white band, whorls 10, longitudinally undulately plicate, the wider interstices spirally striate, base without costæ but the spiral sculpture stronger.

Length, 4 mill.

West Indies, Rio Janeiro.

Unfigured Species.

T. RETICULATA, T. MULTICOSTATA, T. OBELISCUS, T. EXILIS, of C. B. Adams. *Jamaica.*

T. TURRITELLA, Pfr. *Cuba.*

III. *Species of the Pacific Coast of America.*

T. CORA, d'Orb. Pl. 76, fig. 29.

Strong, whitish; whorls 8, flattened, with well impressed suture, strongly, longitudinally costate to the base, interstices wider spirally impressed striate, three of the striæ (four on the body-whorl) more conspicuous. Length, 5 mill.

Near Payta, Peru.

T. FESTIVA, Folin. Pl. 76, fig. 30.

Whitish, subdiaphanous, with a few, very distant longitudinal costæ, extending to the base, the very much wider interspaces spirally striate; whorls 7, suture profound. Length, 2·5 mill.

Panama.

T. TENUICULA, Gould. Pl. 76, fig. 31.

Rather solid, shining, wax-yellow, a little dusky below the suture; whorls 10, flat, slightly shouldered above, with about 20 straight, longitudinal ribs, the summits of which are cut by numerous fine revolving striæ, deeper in the interstices, which extend over the base of the shell, the ribs terminating about the periphery; revolving striæ showing through the aperture.

Length, 7·5 mill.

Southern California.

T. SUBCUSPIDATA, Carp. Pl. 76, fig. 33.

Differs from the preceding in being more distantly ribbed, with broader interspaces, closer and deeper spiral sculpture, the tops of the ribs elegantly muricated with projecting, curved lines between; the suture more deeply impressed.

Length, 6 mill.

S. Diego, Cal.

Perhaps only a variety of the preceding species.

T. TORQUATA, Gould. Pl. 76, fig. 34, 32.

Solid, white; whorls 8, a little convex, with about 16 oblique, flexuous longitudinal ribs, not extending to the base, periphery subangulate, no spiral sculpture, base smooth. Length, 5 mill.

Sta. Barbara, Cal.

T. Vancouverensis, Baird, is a synonym.

Var. STYLINA, Carp. (fig. 34), is a narrower form than the type; *T. gracillima*, Gabb, is a synonym of it; *T. Gabbiana*, Cooper, another.

Unfigured Species.

T. LORDI, E. A. Smith. *Vancouver's Island.*

T. VIRGO, T. CREBRIFILATA, T. CŒLATA, T. AURANTIA, T. CHOCOLATA, T. TRIDENTATA, all of Carpenter. *California.*

T. TENUILIRATA, T. MURICATA, T. GIBBOSA, T. PROLONGATA, T. C.B.ADAMSI, T. GRACILLIMA, T. FLAVESCENS, T. TEREBRALIS, T. UNIFASCIATA, Carpenter. *Mazatlan.*

T. GRACILIOR, T. PANAMENSIS, T. SIMILIS, T. STRIOSA, T. TURRITA, T. ACUMINATA, C. B. Adams. *Panama.*

T. ACULEUS, T. AFFINIS (T. *undata*, Carp., a syn.), C. B. Adams. *Panama and Mazatlan.*

T. CINCTELLA, T. CRATICULATA, T. SUBULA, Mörch. *W. Co. Centr. Am.*

IV. *Polynesian and Australian Species.*

T. HOFMANI, Angas. Pl. 76, figs. 41, 42.

Rather thin, white, shining; whorls 13, slightly convex, longitudinally broadly ribbed, interstices narrow, smooth, ribs abruptly ceasing at the periphery of the last whorl.

Length, 10 mill. *Port Jackson, Australia; Tasmania.*

Described as *T. nitida*, Angas, a name preoccupied by A. Adams. *T. Mariæ*, Tenison-Woods (fig. 42), from Tasmania, appears to be identical.

T. FESTIVA, Angas. Pl. 76, fig. 45.

Semipellucid, white, with a narrow chestnut band on the middle of the whorls, two bands on the body-whorl; whorls 8, rather convex, finely longitudinally plicate, the interstices microscopically spirally striate, suture deep, last whorl smooth at the base. Length, 4 mill.

Port Jackson, Australia.

T. FUSCA, A. Ads. Pl. 76, figs. 46, 47.

Whorls 8, very narrow, rounded, with deeply impressed suture; yellowish or brownish, with a central darker band, two bands on the body-whorl, closely longitudinally plicate, the ribs becoming obsolete towards the base. Length, 6 mill.

Australia, Tasmania, Japan.

In the darker-colored specimens the bands are obscure; in the lighter-colored, they are distinct (= *T. bifasciata*, A. Adams (fig. 47). The form is narrower, more cylindrical, longer than *T. festiva*, but may be only a variety of it.

T. MACLEAYANA, Tenison-Woods. Pl. 76, fig. 44.

Narrowly cylindrical, thin, translucent, white; whorls 12, flatly convex, with deep suture, longitudinally ribbed, ribs terminating at the periphery, interstices and base smooth.

Length, 9 mill. *Tasmania.*

T. TASMANICA, Tenison-Woods. Pl. 76, fig. 40.

Solid, white; whorls 8, convex, suture impressed, with strong, somewhat oblique rounded ribs, terminating at the periphery, the narrower intercostal spaces and base smooth.

Length, 7 mill.

King's Isl. Bass Straits, Tasmania.

Unfigured Species.

T. NEOZELANDICA, Hutton. *New Zealand.*
T. BEDDOMEI, Petterd. *Tasmania.*
T. CIRCUMDATA, Gould. *Sydney Harbor, Australia.*
T. IOTA, Gould. *Hab. unknown.*
T. ACICULARIS, T. CONCINNA, T. BOHOLENSIS, A. Ad. *Philippines.*
T. CORNEA, A. Ad. *Eastern Seas.*
T. BICARINATA, T. POLYZONATA, T. BITTIFORMIS, Carpenter. *Philippines.*
T. DECUSSATA, Pease. *Sandwich Islands.*

V. *Japanese and Chinese Species.*

T. PHILIPPIANA, Dunker. Pl. 76, fig. 37.

Rather thick, whitish; whorls plano-convex, slightly angulated above, strongly longitudinally plicate, plicæ straight, fading out at the periphery, interstices and base thinly striate, the base stronger. Length, 9 mill.

Japan.

T. VARICOSA, Dunker. Pl. 76, fig. 38.

Whorls 13–14, closely longitudinally costate, here and there varicose, terminated on the body-whorl by a peripheral spiral line, decussated by spiral striæ, base thinly spirally lirate.

Length, 11 mill.

Japan.

T. MULTIGYRATA, Dunker. Pl. 76, fig. 43.

Pellucid, white; whorls 17–18, convex, with deep suture, covered throughout with wide oblique, curved costæ.

Length, 16–17 mill. *Japan.*

Unfigured Species.

T. COMPTA, T. ALBELLA, T. SCITULA, T. TEREBRA, T. CERINA, T. CANDIDA, T. DEBILIS, T. METULINA, T. SPECIOSA, T. SCALIOLA,

T. BICINCTA, T. MUNDA, T. CINCTA, T. FRAGILIS, T. SCULPTILIS, T. COMMODA, T. NITIDA, T. MONOCYCLA, T. MODICA, T. VENUSTULA, T. EXIMIA, T. PERFECTA, T. MACILENTA, all of A. Adams. *Japan.*

T. RUBROFUSCA, T. CUMINGII, Carpenter. *China Sea.*

T. CÆLATA, T. ORNATA, Gould. *Hong Kong.*

VI. *Indian Ocean Species.*

T. VELAINI, Tryon. Pl. 75, fig. 99.

White; whorls 8, shouldered, longitudinally straightly plicate, the wider interspaces with slight spiral impressed striæ.

Length, 3·25 mill. *Isl. of St. Paul, Indian Ocean.*

Described by Velain as *T. scalaris*, preoccupied by Philippi.

T. DISCULUS, Velain. Pl. 75, fig. 97.

White; whorls 9, rather flattened, with fine, close longitudinal ribs, terminating at the periphery of the body-whorl.

Length, 3 mill. *Isl. of St. Paul, Indian Ocean.*

T. PERONII, Velain. Pl. 75, fig. 98.

Grayish white, thin, with 7 convex whorls, with irregular longitudinal riblets, becoming more or less evanescent about the middle of the whorls. Length, 2·75 mill.

Isl. of St. Paul, Indian Ocean.

T. TENUICOSTA, Issel. Pl. 75, fig. 4.

White, a little shining; whorls $6\frac{1}{2}$, a little convex, suture margined, thinly, obliquely, longitudinally plicate, plicæ fading out on the last whorl, interstices much wider.

Length, 2·25 mill. *Red Sea.*

T. SOLIDULA, Issel. Pl. 75, fig. 3.

Yellowish white, a little shining, obliquely longitudinally plicate, interstices much wider, suture not margined; whorls 8–9, somewhat convex, plications extending over the last whorl.

Length, 3 mill. *Red Sea.*

T. CRYSTALLINULA, Issel. Pl. 75, fig. 1.

White, pellucid, shining, fragile, with thread-like longitudinal oblique plications extending over all the whorls, and much wider smooth interspaces; whorls 9–10, convex. Length, 2 mill.

Red Sea.

T. NITIDISSIMA, Issel, Pl. 75, fig. 2.

White, translucid, very shining, rather strongly distantly longitudinally plicate, and no spiral lines; whorls 9–10, a little convex, with well-impressed suture, the ribs evanescent on lower part of body-whorl; aperture a little obliquely channeled below. Length, 3 mill.

Red Sea.

T. VENUSTA, Issel. Pl. 75, fig. 100.

White, a little shining, with numerous, vertical costæ; whorls 8–9, somewhat convex, with impressed suture, last whorl subangulated, and without costæ below. Length, 3·25 mill.

Red Sea.

T. CHRYSOZONA, Martens. Pl. 76, fig. 48.

Densely cancellated, white, with a single narrow orange band on the upper whorls, two on the middle ones, three on the last; whorls 12–13, convex, occasionally varicose, last whorl subangulate; columella slightly plicate at the base, where the aperture is a little channeled. Length, 15 mill.

Mauritius.

T. LACTEA, Krauss. Pl. 76, fig. 49.

Solid, white, closely, obliquely, obtusely plicate, with equal smooth interstices; whorls 10–12, slightly convex, lower half of body-whorl smooth. Length, 3·5 mill.

Cape of Good Hope.

Unfigured Species.

T. TRACHEALIS, T. OBELISCUS, Gould. *Simon's Bay, So. Africa.*

T. LIRATA, T. DECUSSATA, T. TRILINEATA, A. Ad. *Ceylon.*

T. WOOD-MASONI, T. VITTATA, T. TÆNIATA, T. SUBEMARGINATA, T. MICROCHEILOS, T. INTUSLIRATA, T. CORPULENTA and var. MINIMA, all of Folin. (Desc. and figures inaccessible to me.)

Andaman Is.

Subgenus DUNKERIA, Carp., 1857.

T. CANCELLATA, d'Orb. Pl. 76, fig. 50.

Thin, corneous, spirally ribbed, with equal interspaces, ribs decussated into granules by longitudinal sulcations; whorls 5, suture channeled. Length, 2 mill.

Cuba.

T. LAMINATA, Carp. Pl. 76, fig. 51.

Whorls 8 (besides 2 nuclear ones), convex, with deep suture; longitudinally and spirally ribbed, the interstices of the decussations appearing pitted, on the last whorl the longitudinal sculpture becomes evanescent below the periphery; yellowish or fulvous, more or less distinctly narrowly fasciate with lighter color on the spire, bifasciate on the body-whorl.

Length, 6·25 mill.

San Diego, Sta. Barbara, Cal.

Unfigured Species.

T. INTERMEDIA, T. SUBANGULATA, T. CANCELLATA, T. PAUCILIRATA, of Carpenter. *Mazatlan.*

T. MAJOR, C. B. Adams. *Panama.*

T. GEMMULOSA, C. B. Adams. *West Indies.*

T. SUTURALIS, Gould. *So. Carolina.*

T. LATELIRATA, Folin. *Andaman Is.*

T. FASCIATA, Tenison-Woods. *Tasmania.*

Section CINGULINA, A. Adams, 1860.

T. SPINA, Crosse and Fischer. Pl. 76, figs. 52, 53.

Whorls numerous, flattened, with scarcely distinct suture, encircled by three spiral ribs, four on the body-whorl, the lower part of which is smooth, white. Length, 9 mill.

Gulf of St. Vincent, Australia.

I think *T. Brazieri*, Angas (fig. 53), will prove synonymous: it is from Port Jackson, Australia.

T. CINGULATA, Dunker. Pl. 76, fig. 35.

Whorls numerous, scarcely convex, suture distinct, with three revolving ribs on the spire-whorl, seven on the body, intersticess striate, white. Length, 10 mill.

Japan.

T. TEREBRA, Dunker. Pl. 76, fig. 36.

White, shining; whorls 12, scarcely convex, those of the spire with three revolving ribs, body-whorl with eight ribs, the lower ones smaller. Length, 8 mill.

Japan.

E. Isseli, Tryon. Pl. 76, fig. 64.

A little shining, translucent, white, spirally cingulated, interstices longitudinally striated; whorls 9, the last with 4 cingulations, base smooth. Length, 3·5 mill.

Red Sea.

Described by Issel as *Eulimella cingulata*, the specific name preoccupied in Cingulina by Dunker.

Unfigured Species.

T. circinata, A. Adams. *Japan.*
T. australis, Tenison-Woods. *Tasmania.*
T. carinata, Folin. (Paper inaccessible to me.)

Genus LIA, de Folin, 1872.

L. decorata, Folin. I am not able to consult the description of this species.

Genus MURCHISONIELLA, Mörch, 1875.

M. spectrum, Mörch (unfigured). *St. Thomas, W. I.*

Genus VANESIA, A. Adams, 1861.

V. trifasciata, V. sulcatina, A. Adams (unfigured). *Manchuria.*

Genus EULIMELLA, Forbes, 1846.

I. *European Species.*

E. Scillæ, Scacchi. Pl. 76, figs. 63, 56.

White, rather solid, polished; whorls 11–12, flatly convex, the last subangulated on the periphery. Length, 9 mill.

Europe.

E. crassula, Jeffreys, and *E. Macandrei*, Forbes (fig. 56), are synonyms.

E. compactilis, Jeffreys. Pl. 76, fig. 58.

Shell thinner, much smaller, not so strongly keeled.
Length, 2·5 mill.

Boreal and *Arctic Europe.*

E. superflua, Monts. (Mediterranean), is possibly a synonym, according to Jeffreys; it has not been figured.

E. ACICULA, Phil. Pl. 76, figs. 59–61, 54, 62.

Rather thin, semitransparent, polished, glassy white in live, milk-white in dead specimens; whorls 8–9, narrow, flattened, periphery scarcely angulated. Length, 4·33 mill.

Europe.

Monterosato has changed the name to *E. commutata* on account of *Auricula acicula*, Lam., a fossil species which is a very doubtful Eulimella.

Var. TURRIS, Forbes.

Shell of nearly equal breadth throughout, with rather convex whorls.

Var. VENTRICOSA, Forbes.

Shell thinner, with tumid whorls and deeper suture.

E. gracilis, Jeffreys; *E. turritellata*, Requien, and *E. affinis*, Phil. (fig. 62), are synonyms. Monterosato, who considers *ventricosa* a distinct species, has described a var. *minima* (unfigured).

Var. OBELISCUS, Jeffreys. Pl. 76, fig. 54.

Shell smaller and narrower, with more compact whorls.

E. STRIATULA, Jeffreys. Pl. 76, fig. 55.

Very slender; whorls 8–9, flattened, suture distinct; white with distinct spiral striæ. Length, 2·5 mill.

Spezia, Italy.

E. NITIDISSIMA, Mtg. Pl. 77, fig. 79.

Very thin, transparent, lustrous; whorls 7 (besides the nucleus), convex, finely spirally striate, white. Length, 2·5 mill.

Europe.

E. CRASSA, Jeffreys. Pl. 77, fig. 81.

Thick, opaque, glossy, smooth, white; whorls 8–10 (?), flattened, suture slight; lip thick, with 8–10 spiral striæ within, columella with a strong spiral tooth.

Length (a fragment only), 6 mill.

Mediterranean Sea.

This species has the mouth of an Odostomia, but the form of the shell and want of sculpture together constitute an Eulimella as to external appearance.

E. PRÆLONGA, Jeffreys. Pl. 77, fig. 72.

Thin, semitransparent, very glossy, white; whorls 10, flattened, suture slight; columella with a small, tooth-like thickening.

Length, 6·75 mill.

Mediterranean Sea, West Coast of Africa.

Another problematical species as to its generic position; the tooth, however, is not nearly so distinct as in the last. It might almost rank as a colorless variety of *E. unifasciata*, Forbes (see American species).

Unfigured Species.

E. ANGUSTA, and Var. PERANGUSTA, Monts. *Mediterranean Sea.*

E. CINGULATA, Requien. *Corsica.*

E. POINTELI, Folin (desc. and figure inaccessible).

Port Said, Egypt.

E. nitidissima, var. *pura*, Monterosato, is a synonym. It was found at St. Vito.

E. MACILENTA, Monterosato. *Mediterranean.*

Name substituted for *Odostomia debilis*, Monts., not Pease.

E. FOLINI, Fischer. (Probably exotic.) *France.*

II. *Oriental Species.*

E. ARABICA, Issel. Pl. 76, fig. 57.

Shining, very minutely decussated, translucent, whitish, with narrow yellowish bands; whorls 12–13, flattened, the suture impressed, margined. Length, 5 mill.

Red Sea.

E. PHILIPPIANA, Dunker. Pl. 77, fig. 75.

White, subpellucid, very smooth and shining; whorls 9, flattened. Length, 11 mill.

Japan.

Unfigured Species.

E OPACA, E. VITREA, E. HYALINA, A. Adams. *Japan.*

E. CYLINDROPSIS, E. INFUNDIBULATA, Folin. *Andaman Is.*

III. *American Species.*

E. UNIFASCIATA, Forbes. Pl. 77, fig. 73; Pl. 76, fig. 65.

Smooth, polished, white, with a median, narrow, light chestnut band; whorls 11, flattened. Length, 6 mill.

New England, Azores, Bay of Biscay, Mediterranean.

This is *Eulimella Smithii*, Verrill (fig. 65). The columellar tooth is inconspicuous, and the form of the shell places it in Eulimella rather than Odostomia.

E. POLITA, Verrill. Pl. 77, fig. 67.

Whorls 12, well rounded, smooth and glossy. Length, 8 mill.

Eastport, Maine.

Appears to be closely allied to *E. ventricosa*, Forbes.

E. LUCIDA, Verrill. Pl. 77, fig. 68.

Whorls 11, flattened, smooth, polished, with very indistinct growth-lines, suture distinct, but scarcely at all impressed, translucent pinkish white. Length, 8 mill.

New England (2033 fathoms).

E. CHARISSA, Verrill. Pl. 77, fig. 69.

Small and delicate; whorls 11, very slender, translucent white. Length, 5·6 mill.

New England (2033 fathoms).

Smaller, with much more slender spire and smaller apical whorl than the last; there are also more whorls in the same length, they are somewhat more convex and the suture more impressed.

E. NITIDA, Verrill. Pl. 77, fig. 70.

Smooth, polished, rather large for the genus, moderately elongated, with a tall, regularly tapering spire of more than eight moderately convex whorls (apex broken), separated by a well-defined, somewhat impressed, rather oblique suture.

Length (broken), 6·5 mill.

New England (2033 fathoms).

Most like *E. lucida*, but the whorls are more convex, the suture more oblique and more impressed, the body-whorl longer, more produced anteriorly, the aperture narrower, more elongated, and effuse in front.

E. LISSA, Verrill. Pl. 77, fig. 71.

Small, white, polished; whorls 8, flattened, smooth, suture distinct. Length, 6 mill.

Off Cape Hatteras, N. C. (142 fms.)

Remarkable for the small size of the apical whorl and for its pupiform outline.

E. ENGONIA, Bush.

White, lustrous; whorls 7½, flattened, distinctly chamfered above the channeled suture, body-whorl distinctly angulated at the periphery, where there is a prominent rounded thread—there are also numerous indistinct, unequal striæ only visible under a microscope; columella with a small distinct fold, not seen in a front view. Length, 6·5 mill.

Cape Hatteras, and *Beaufort, N. C.*

Described as an Odostomia, and placed here with some doubt on account of the long slender shell.

Var. TERES, Bush. Pl. 77, fig. 82.

More slender, with flatter whorls, with a distinct impressed spiral line just below the angle.

E. ALBA, Calkins. Pl. 76, fig. 66.

Small, white, shining, pellucid; whorls 12–13, smooth, flat, suture lightly impressed. Length, 7·5 mill.

Cedar Keys, Florida.

E. SIMPLEX, d'Orb. Pl. 77, fig. 74.

Shell thin, white, finely spirally striate; whorls 7, slightly convex, with a shallow channel next above the suture. Length, 2·3 mill. *Jamaica.*

Unfigured Species.

E. OBSOLETA, Carpenter. *Mazatlan.*
E. PELLUCENS, E. OPALINA, A. Adams. *Japan.*

Section OCEANIDA, Folin, 1870.

E. GRADUATA, Folin. (Desc. not accessible). *West Indies.*

Section Liostomia, Sars, 1878.

E. clavula, Lovén. Pl. 77, fig. 76.

Thin, transparent, polished, microscopically longitudinally striated, white; whorls 4–5, rather convex, suture slightly margined; umbilicus very small and narrow, but distinct; columella with a barely discernable tooth or fold. Length, 2 mill.

Europe.

E. pistillus and *E. pistilliformis*, Brugnone, and *E. Brugnoni*, Monts., are synonyms.

E. eburnea, Stimpson. Pl. 77, fig. 78.

White, shining, smooth; whorls 4, rather convex, subangulated at the suture; aperture ovate-elliptic, peristome thin, simple, acute, effuse anteriorly; umbilicus narrow.

Length, 4·5 mill.

New England.

E. electa, Jeffreys. Pl. 77, fig. 77.

Thin, nearly transparent, glossy, with microscopical growth-lines; whorls 4, rather swollen, with deep suture; umbilicus small and narrow; columella with a superior, small, sunken tooth. Length, 2 mill.

Between the Hebrides and *Faroë Is.* (516 fms.).

Section Stylopsis, A. Ad., 1860.

E. typica and E. sulcata, A. Ad. (Unfigured). *Japan.*

E. rufofasciata, E. A. Smith (Unfigured) *Japan.*

Subgenus Menestho, Möller, 1842.

E. albula, Möller. Pl. 77, fig. 80.

Corpulent, white; whorls slightly convex, with numerous spiral lines. Length, 5 mill.

Labrador to Greenland.

This is not the *E. albula* of most American authors which = the next species.

E. STRIATULA, Couthouy. Pl. 77, fig. 87.

Narrow, thick, whitish; whorls 7–9, flatly convex, with distinct suture, with growth-lines, sometimes varicose, and 12–15 fine, regular revolving striæ. Length, 15 mill.

Massachusetts, northwards.

Is *E. albula*, Gould, Tryon, etc., not of Lovén.

E. SULCATA, Verrill. Pl. 77, fig. 86.

Whorls 4, convex, with deep suture, white, spirally, numerously striate, umbilicus very narrow. Length, 3 mlll.

New England (115,365 fms).

E. BRUNERI, Verrill (Unfigured). *Off Newport, R. I.* (487 fms).

E. HUMBOLDTI, Risso. Pl. 77, figs. 83–85.

Whorls 5, and nucleus, rather solid, stout, a little convex, with deep suture, with numerous spiral riblets decussated by longitudinal striæ; columella with a strong superior plication; white. Length, 6 mill.

Mediterranean Sea.

The synonyms are *E. lactea*, Michaud; *E. clathrata*, Phil.; *E. turriculata*, Calcara; *E. Kuzmici*, Brusina; *E. subventricosa*, Phil., and *E. brevis*, Requien, the two last given as varieties.

Var. TUBERCULATA, Bucq. Dautz. et Dollf. Fig. 85.

Sculpture stronger, forming a granulated surface.

Var. SULCATA, Bucq. Dautz. et Dollf. Fig. 84.

Spirally sulcate, the longitudinal sculpture deficient.

Unfigured and Doubtful Species.

E. BULINEA, Lowe.

Mediterranean Sea, Canary and Madeiran Islands.

The synonyms are *E. dissimilis*, Tiberi; *E. striata*, Brocchi; *E. elongata*, Phil.; *E. Humboldti*, var. *elongata*, Requien.

E. CRATICULATA, Renier. *Mediterranean.*

E. EXARATA, A. Ad. *Japan.*

Genus ODOSTOMIA, Fleming, 1828.

I. *European.*

The sections are only used for the European species.

Section Odostomia, sensu stricto.

O. plicata, Mont. Pl. 77, fig. 88.

Thin, transparent, polished, with microscopic spiral striæ, very pale yellowish white or white, darker at the suture; whorls 5–6, suture moderate; umbilicus none, or a narrow chink in full-grown specimens; columellar tooth small, but distinct.

Length, 2·5 mill.

Europe.

It is *O. elongata*, Phil., *O. bulimoides*, Scacchi.

O. pallida, Mont. Pl. 77, fig. 89.

Rather solid, nearly opaque, somewhat glossy, with microscopic spiral striæ, milk-white or yellowish white; whorls 6–7, somewhat convex, rapidly enlarging, suture moderate, distinct; umbilical chink very narrow or none; tooth strong.

Length, 5 mill.

Europe.

O. Novegradensis, Brusina, *O. Eulimoides*, Hanley (figured), are synonyms. Jeffreys cites:—

Var. crassa, Thompson.

Smaller and thicker; some of the spiral striæ confluent, forming elevated ridges.

Var. notata, Jeffreys.

Whorls more convex, spiral striæ more conspicuous.

Var. angusta, Jeffreys.

Thinner and more slender.

O. sublonga, Jeffreys. Pl. 77, fig. 90.

Rather thick, semitransparent, glossy, ivory-white; whorls 4–5, the last obsoletely angulated on the periphery; tooth minute, but distinct. Length, 2·5 mill.

Bay of Biscay, Cape Verd Is., Mediterranean Sea.

O. INSCULPTA, Mont. Pl. 77, fig. 91.

Thin, semitransparent, glossy, with distinct spiral incised lines, with inconspicuous longitudinal striæ near the suture, white; whorls 6, each narrowly, thickly rimmed just below the suture, which is slightly channeled; umbilicus narrow; tooth inconspicuous but always present. Length, 3·75 mill.

Northern Europe.

It is *O. obliqua*, Lovén.

O. UMBILICARIS, Malm. Pl. 77, fig. 92.

Shell thin, transparent, very glossy, white; whorls 5–6, with deep suture; umbilicus very distinct, but small; tooth small, but prominent. Length, 2·5 mill.

Northern Europe.

Owing to the transparency of the whorls, the periphery of each appears like a narrow band round the top of the succeeding one.

O. MICHAELIS, Brugnone. Pl. 77, fig. 93.

Oblong ovate, smooth, shining; whorls 6, slightly convex, columella strongly uniplicate. Length, 5·5 mill.

Mediterranean Sea.

O. RISSOIDES, Hanley. Pl. 77, figs. 94–96.

Thin, transparent, glossy, with microscopical growth-lines and spiral striæ, pale yellowish white, or whitish; whorls 5, convex, rapidly enlarging, suture rather deep, in fresh specimens with a darker band; umbilicus usually none, or a mere chink or indentation; tooth small and partly concealed.

Length, 3 mill.

Europe.

Var. ALBA, Jeffreys.

Thinner, spire produced, suture deeper and more oblique, umbilical chink very distinct.

Var. NITIDA, Alder. Fig. 95.

Whorls more ventricose and umbilicus distinct.

Var. GLABRATA, Forbes and Hanley. Fig. 96.

Nearly oblong, nucleus of spire exposed and mamillary, suture deep.

Var. DUBIA, Jeffreys.

Oval, more solid, body-whorl longer, umbilical chink distinct, tooth stronger.

Var. EXILIS, Jeffreys.

Smaller and more slender; spire elongated, suture slight.

O. LUKISI, Jeffreys. Pl. 77, fig. 97.

Solid, opaque, glossy, sculpture only very slight, almost microscopical scratch-like longitudinal striæ, ivory-white; whorls 5–6, convex, the penultimate a little projecting; umbilicus small, but distinct; tooth small and prominent. Length, 2·5 mill.

Great Britain.

O. UNIDENTATA, Mont. Pl. 77, figs, 98, 100.

Solid, almost opaque, glossy, with a more or less distinct peripheral angle, visible also at the base of the upper whorls, sculpture slight, microscopical, close-set spiral striæ, white; whorls 6 (besides the nucleus), flattened, suture narrow, distinct; umbilicus none, although there is sometimes a small chink; tooth long and prominent. Length, 5 mill.

Iceland, *Europe*, *West Africa*, *Canaries*, *Madeira*, *Pernambuco.*

O. Monterosati, Bucq. Dautz. et Dollf. (fig. 100), is a young shell of this species according to Dr. Jeffreys; who mentions a var. *elata*, with more elongated spire and narrower base.

O. TURRITA, Hanley. Pl. 77, fig. 99.

Solid, semitransparent, glossy, microscopically spirally striate, periphery obtusely keeled; yellowish white or whitish, with a dark border below the suture; whorls 5–6 (besides the nucleus), suture narrow but distinct; umbilicus none; tooth small, not prominent. Length, 3 mill.

Europe, *Teneriffe*, *Madeira*, *Pernambuco.*

O. turriculata, Monts. and var. *nana*, Jeffreys, are enumerated as varieties by Dr. Jeffreys.

O. ACUTA, Jeffreys. Pl. 77, fig. 1.

Shell rather solid, but semitransparent and lustrous, with microscopic close spiral striæ, and still more minute, flexuous, crowded growth-lines, whitish with a tinge of flesh-color; whorls

6, besides the embryonic ones, periphery obtusely keeled ; umbilicus conspicuous though small ; tooth strong and prominent.

Europe, *Canary Is.*, *Teneriffe*.

The outer lip is occasionally striate within.

Var. UMBILICATA, Alder.

Larger, stronger, white, with a broad base and usually wider and deeper umbilicus ; peripheral keel obscure.

O. ALBELLA, Lovén. Pl. 77, fig. 3.

Thin, semitransparent, dull yellowish white ; whorls 5–6, suture narrow, incised, narrowly banded below ; imperforate, or sometimes a narrow chink ; tooth small, retired, nearly hidden behind the pillar. Length, 2·75 mill.

Europe.

O. SULCIFERA, Smith. Pl. 77, fig. 4.

White, polished ; whorls 5, subplane, indistinctly longitudinally striate, with a sutural pellucid zone, and a linear sulcus on the periphery ; columella lightly dentate. Length, 5 mill.

Whydah, *West Africa*.

O. FALLAX, Monts. (Unfigured). *Mediterranean*.

Section MEGASTOMIA, Monts., 1884.

O. CONSPICUA, Alder. Pl. 77, fig. 5.

Shell solid, opaque, glossy, with microscopic spiral and longitudinal striæ ; pale cream color, varying to chocolate, and more or less stained with madder ; whorls 8 (besides 2 embryonic), periphery obtusely angulated, the angle showing at the base of the spire whorls ; umbilicus extremely small, almost covered ; tooth strong, conspicuous, outer lip grooved within.

Length, 8·75 mill.

Europe.

O. CONOIDEA, Brocchi. Pl. 77, fig. 6.

Solid, white, polished, with microscopic growth-lines, periphery more or less distinctly keeled or angulated, with an impressed spiral line ; whorls 8, nearly flat ; umbilicus small, deep ; tooth

strong, prominent, interior of lip ridged, terminating in small tubercles within the mouth. Length, 6·25 mill.

Europe.

The synonyms include *O. polita*, Bivona; *O. Nagli*, Brusina; *O. sicula*, Phil.; *O. monodon*, Requien; *O. plica*, Cantraine.

O. TENUIS, Jeffreys. Pl. 77, fig. 2.

Rather thin, nearly transparent, glossy, no sculpture except microscopic growth-lines; whorls 6; imperforate; tooth small but conspicuous, interior of lip with half a dozen short grooves or striæ. Length, 2·5 mill.

Brittany, Tunis.

Section ONDINA, Folin, 1870.

O. OBLIQUA, Adler. Pl. 77, figs. 10–12.

Very thin, transparent, glossy, with fine, close spiral striæ, becoming coarser on the base, whitish; whorls 5, suture deep and oblique; outer lip flexuous, retreating, sinuated above, smooth within, tooth only a slight obscure fold; umbilicus none, or a very small chink. Length, 5 mill.

Europe.

O. exilissima, Brusina, is a probable synonym.

Var. WARRENI, Thompson. Figs. 11, 12.

Smaller, with the basal striæ more distinct, and the umbilicus more developed.

O. Galvagni, Aradas, is a synonym.

O. DIAPHANA, Jeffreys. Pl. 77, fig. 9.

Very thin, nearly transparent, lustrous, with microscopic growth-lines, whitish; whorls 5, suture narrow, oblique; outer lip flexuous, deeply sinuous above, tooth obsolete; umbilicus developed in the adult only, insignificant. Length, 2·5 mill.

Europe.

O. ELEGANS, Monts. Pl. 77, fig. 13.

Pellucid, white, decussated by microscopic striæ; whorls 7, convex, suture submargined; columella obliquely uniplicate. Length, 4 mill.

Sicily.

It is *O. vitrea*, Brusina, not A. Ad.; *O. neglecta*, Tiberi, not

A. Adams; *O. striata*, Folin. Monterosato enumerates vars. *simplex*, *exigua* and *concinna*, Monts., and *vixornata*, Folin.

Unfigured Species.

(*Including those of which the descriptions are not accessible*).

O. MODIOLA, O. DILUCIDA, Monts. *Mediterranean.*

O. MESSANENSIS, O. GRANATA, O. SEMIORNATA, Folin. Both considered by Mts. synonyms of *O. exilissima*, Brusina, which Jeffreys unites with *O. obliqua*, Alder.

O. SCANDENS, Brusina (*O. obliqua*, Mts., not Alder). *Mediterranean.*

O. SULCATA, O. BILIRATA, Folin. *West Africa.*

Section DOLIELLA, Monts., 1880.

O. NITENS, Jeffreys. Pl. 77, fig. 15.

Thin, semitransparent, very glossy, with microscopic growth-lines, white; whorls 3, besides the nucleus, suture very narrow, slightly excavated, margined by the overlapping of the whorls; umbilicus none; tooth represented by a broad, but not conspicuous, fold. Length, 2·5 mill.

Mediterranean Sea.

Jeffreys refers *O. Erjaveciana*, Brusina, to this species, but Monterosato considers the two species very different.

O. DOLIOLIFORMIS, Jeffreys. Pl. 78, fig. 26.

Rather thin, transparent, somewhat glossy, with about 20 remote and somewhat wavy spiral striæ, almost perceptible by the naked eye, and numerous microscopic growth-lines, whitish or yellowish white; whorls 3, besides the nucleus, slopingly convex, suture channeled; outer lip abruptly incurved on the periphery, tooth strong and conspicuous; umbilicus a small chink. Length, 1·85 mill.

Europe.

O. valida, Folin, is a synonym.

Section Auristomia, Monts., 1884.

O. bulimulus, Brugnone. Pl. 77, fig. 14.

Shell thin, smooth, shining; whorls 6, slightly convex; aperture long and rather narrow, with a plicate tooth above.

Length, 5 mill. *Mediterranean.*

O. bulimoides, Brugn., is a synonym.

Unfigured Species.

O. Erjaveciana, Brusina (Syns. *O. turriculata*, Monts., and *O. retardata*, Tiberi). *Mediterranean.*

O. fusulus, Monts. *Mediterranean.*

O. myosotis, Brugnone. *Mediterranean.*

Section Pyrgulina, A. Ad., 1863.

O. decussata, Mont. Pl. 77, fig. 7.

Rather thin, semitransparent, somewhat glossy, with 20–25 flexuous longitudinal ribs and finer, thread-like spiral striæ, whitish; whorls 4, besides the nucleus, convex, suture deep and channeled; umbilicus slight, forming a narrow chink; tooth very retired and inconspicuous, consisting of a narrow oblique fold. Length, 3 mill.

Europe.

It is *Helix arenaria*, Maton and Rackett.

O. eximia, Jeffreys. Pl. 77, fig. 8.

Rather solid, semitransparent, glossy, with fine curved longitudinal ribs, which do not reach the base, these, or more frequently their interstices are crossed by three spiral striæ or finer ribs on the middle of the body-whorl, giving the shell a partially cancellated appearance, the next whorls have two or three similar striæ near the base; whorls 4–5, very convex, almost tumid, suture very deep; umbilicus extremely narrow but distinct; tooth minute, somewhat retired and obscure.

Length, 1·5 mill. *Boreal Europe.*

O. Barleei, Clark, is a synonym.

O. INTERSTINCTA, Mont. Pl. 77, figs. 16, 17; Pl. 78, fig. 21.

Rather solid, semitransparent, glossy, with numerous strong, slightly curved longitudinal ribs, broader than the interstices, ending at two or three rows of obscure spiral striæ just below the periphery, forming punctures in the interstices, the upper whorls similarly marked just above the suture, base generally smooth, color white; whorls 5–6, compressly convex, shelving abruptly towards the suture, each with a thickend rim round the top, suture narrow, but deeply excavated; outer lip flexuous, slightly sinuated above; umbilicus none, or a narrow chink in old specimens; tooth short and retired, but strong.

Length, 3 mill.

Europe, Canary Is., Madeira.

Var. TEREBELLUM, Phil. Fig. 17.

Much larger, with elongated spire, ribs more oblique, especially on the body-whorl, tooth prominent.

O. Moulinsiana, Fischer (figured), appears to be equivalent to this.

Var. SUTURALIS, Phil. Fig. 21.

Smaller, narrower and more cylindrical than the type, costæ very fine and well curved.

O. striata, Phil. (figured), is a synonym.

Var. GRACILIS, Phil.

Shining, longitudinally obliquely ribbed, with a single spiral line on the upper whorls, two on the body-whorl; whorls 5, suture well impressed. A minute, rather doubtful shell, variously interpreted; the following species has been referred to it. *O. ambigua*, Weinkauff, is identical.

O. EMACIATA, Brusina. Pl. 78, fig. 22.

Shell narrow, cylindrical, having 5 convex whorls besides the embryonic one, with strong longitudinal ribs and subequal interspaces, periphery marked by a spiral thread, below which, on the body-whorl, the ribs become evanescent; tooth minute.

Length, 2·1 mill.

Mediterranean.

It is *O. pygmæa*, Brus., not Grateloup; *O. Silvestri*, Arad.

O. MONOZONA, Brusina. Pl. 78, fig. 18.

Whorls 4, convex, longitudinally ribbed, with wider intervals, ribs disappearing gradually towards the base of the last whorl, a few spiral striæ on the interstices about the middle of the last whorl; white; tooth small. Length, 2 mill.

Mediterranean Sea.

O. INTERMIXTA, Monts. Pl. 78, figs. 19, 20.

Whorls 4, besides the embryonic, slightly rounded, with strong longitudinal ribs, nearly straight, and fewer in number than in *O. interstincta*, a spiral thread near the suture, and on the periphery of the last whorl, tooth minute.

Mediterranean.

It is *O. Jeffreysi*, Bucq., Dautz. et Dollf., not Koch and Weichman, the latter a miocene species of earlier description.

Var. FLEXICOSTA, Bucq., Dautz. Dollf. Fig. 20.

More elongated than the type, the ribs flexuous.

O. PENCHYNATI, Bucq., Dautz. Dollf. Pl. 78, fig. 25.

Closely related to *O. interstincta* and *O. intermixta*, but distinguished by its short pupoidal form and turriculated whorls. Length, 1·6 mill.

Mediterranean Sea.

O. ABBREVIATA, Monts. Pl. 78, fig. 23.

Solid, opaque, glossy, with about a dozen strong sharp longitudinal ribs, terminating abruptly at the bluntly angulated periphery; white; whorls 4, besides the nucleus, suture shallow; tooth small, indistinct; umbilicus none. Length, 2·5 mill.

Mediterranean Sea.

Described by Jeffreys as *O. brevicula*, preoccupied by Monterosato.

O. SPIRALIS, Mont. Pl. 78, fig. 52.

Rather solid, semitransparent, glossy, with about 30 straight or slightly curved ribs, broader than the interstices, terminated at the angulated periphery by a series of spiral basal striæ, which are often closely punctured; whorls 5–6, flatly convex, shelving towards the suture which is narrow and deep; outer lip sinuous above; umbilicus a rather prominent chink; tooth very short, blunt and obscure. Length, 3 mill.

Europe.

O. TURBONILLOIDES, Brusina. Pl. 78, fig. 24.

Shell smaller than the preceding species, the whorls more flattened, ribs straighter, equaling the interstices, basal spiral striæ stronger. Length, 1·6 mill.

Mediterranean.

O. BREVICULA, Monts., O. AMOENA, Monts. (*O. venusta*, Mts., a synonym), O. NARDOI, Brusina (all unfigured).

Mediterranean.

Section ODOSTOMIELLA, Bucq., Dautz. Dollf. 1883.

O. DOLIOLUM, Phil. Pl. 78, figs. 27, 28, 30.

Solid, with smooth, longitudinal, rounded ribs without intervals; whorls 4, besides the nucleus, convex, with well impressed suture; yellowish, with two narrow spiral brown lines, three on the body-whorl, tooth moderate. Length, 2·2 mill.

Mediterranean.

The synonyms are *O. regularis*, Folin; *O. tricincta*, Jeffreys (fig. 30); *O. bicincta*, Tiberi; *O. unicincta*, B. D. D., the last referring to variations in the banding; and *O. cylindrica*, B. D. D. (fig. 28), and *elongata*, Monts., both described as more narrowly elongated forms.

Section ELODIA, Folin, 1870.

O. HORTENSIÆ, Nansouty. Desc. inaccessible to me.

Section MIRALDA, A. Ad., 1863.

O. EXCAVATA, Phil. Pl. 78, fig. 31.

Solid, opaque, rather glossy, with prominent spiral ridges, of which there are three on the main part of the body-whorl, and two slighter ones at the base, and two ridges on the spire whorls, crossed obliquely by sharp longitudinal ribs, extending to the base, the intersections with the spiral sculpture appearing nodulous, white; whorls 6, suture broad and very deep; tooth small and remote; umbilicus narrow but distinct. Length, 3·75 mill.

Europe.

The synonyms are *O. trinodosa*, Rayneval; *O. turrita*, Metcalfe; *O. Deshayesiana*, Recluz; *O. Harveyi*, Thompson.

O. CANALICULATA, Phil. Pl. 78, fig. 29.

Shell with three series of granulations on the upper whorls, six on the body-whorl; whorls flattened, suture deeply channeled. Length, 2·5 mill.

Mediterranean.

O. intermedia, Brusina, is a synonym. This species scarcely differs from the preceding.

II. *Species of East Coast of United States, and West Indies.*

O. IMPRESSA, Say. Pl. 78, figs. 33, 34.

Thick, opaque; whorls 7, flat, with deep suture, body-whorl with 15 revolving lines, the upper ones more distant, about four lines on the next whorl, the number of lines diminishing on the upper whorls; tooth distinct. Length, 5 mill.

New England to *Florida.*

O. insculpta, DeKay, is a synonym.

Var. GRANATINA, Dall. Fig. 34.

Posterior ribs strongly nodulous. *Cedar Keys, Fla.*

O. TRIFIDA, Totten. Pl. 78, figs. 36, 37.

Smooth, glossy; whorls 8, with about 6 impressed revolving lines, the one above and two next below the suture wider and more distinct, ten or twelve very minute lines at the base of the body-whorl; fold sharp, oblique; color ivory or soiled white. Length, 5 mill.

New England, New York.

O. MARGINATA, Cailliaud (fig. 37), appears to be a specimen of this shell, accidentally carried to French shores.

O. PRODUCTA, C. B. Adams. Pl. 78, fig. 43.

Whorls 8, flatly convex, white, under a light brown epidermis, smooth, columella flexuously plicate. Length, 5 mill.

Massachusetts.

O. FUSCA, C. B. Adams. Pl. 78, fig. 41.

Whorls 6, rather flat, suture strongly impressed, with an impressed line below it, smooth, white under a shining brown epidermis; fold remote, occasionally double, and sometimes obsolete. Length, 6 mill.

New England to *Florida.*

O. DEALBATA, Stimpson. Pl. 78, fig. 40.

White, smooth, pellucid; whorls 6, rather convex, fold inconspicuous. Length, 4 mill.

Massachusetts.

O. MODESTA, Stimpson. Pl. 78, fig. 39.

White, smooth; whorls 4, flattened, periphery obtusely angulated, suture impressed; columellar fold small, oblique.

Length, 3·5 mill.

St. George's Banks.

O. SEMINUDA, Adams. Pl. 78, fig. 35.

Whorls 7, convex, those of the spire and upper half of the body longitudinally plicate, crossed by three spiral lines, giving a granulated appearance, the folds terminate at the periphery, below it on the body-whorl are four spiral striæ; suture distinct, indistinctly margined; pillar fold inconspicuous; glossy white, translucent. Length, 3·75 mill.

New England to Florida.

O. BISUTURALIS, Say. Pl. 78, fig. 38.

Smooth, epidermis light brownish; whorls 5–6, with an impressed revolving line below the suture, periphery obtusely angulated. Length, 5 mill.

New England.

Jaminea exigua, Couth., and *Rissoa rupestris*, Forbes, are synonyms.

O. CEDROSA, Dall. Pl. 78, fig. 42.

Whitish, thin, seven whorls, reticulated by longitudinal plications and narrower interspaces and revolving striæ, at the periphery the plications cease, but the spiral sculpture is continued to the base, but fainter and closer, suture submargined by a deeper line; white; fold obsolete or very faint; no umbilicus.

Length, 5·5 mill.

Cedar Keys, Fla., on mud flats.

O. LÆVIGATA, d'Orb. Pl. 78, fig. 44.

Thin, oblong, whitish, smooth, shining; whorls 6, slightly convex, suture opaquely margined, columella with a very slight fold. Length, 4 mill.

St. Thomas, W. Indies.

Unfigured and doubtful Species.

O. DISPARILIS, O. TORNATA, Verrill. *New England.*
O. ACUTIDENS, Dall. *Florida.*
O. CORTICARIA, Say. = *Pupa.*
O. SOLIDULA, O. CANALICULATA, O. OVULOIDES,
O. (MIRALDA) BABYLONICA, all of C. B. Adams. *Jamaica.*
O. (SPIROCLIMAX) SCALARIS, Mörch. *St. Thomas, W. I.*
O. TORCULA, Mörch. *St. Thomas, W. I.*
O. CUBENSIS and O. PUSILLA, Pfr. *Cuba.*

III. *Species of West Coast of North America.*

O. INFLATA, Carp. Pl. 78, fig. 45.

Thin, light ashy, under an ash-colored epidermis; whorls 4, besides the nucleus, rapidly increasing, suture impressed, very minutely, closely spirally striated; no umbilicus; tooth transverse, acute. Length, 6·5 mill.

California.

O. Sitkensis, Dall. MS., is doubtfully referred to this species.

O. MUCIFORMIS, Carp. Pl. 78, fig. 46.

Compact, smooth, solid, white; whorls 5, besides the nucleus, subplanate, margins excavated, base lengthened, not umbilicated; lip solid, tooth obtuse, transverse. Length, 7·5 mill.

Neeah Bay.

O. SATURA, Carp. Pl. 78, fig. 48.

Solid, smooth, white; whorls 5, besides the nucleus, convex, with impressed suture, base rounded, subumbilicated, lip scarcely sinuated; plica strong, transverse. Length, 7 mill.

Neeah Bay.

Vars. GOULDI and PUPIFORMIS are indicated by Carpenter.

O. STRAMINEA, Carp. Pl. 78, fig. 47.

Like an elate *O. satura*, but much more elate, not inflated, epidermis light yellowish, without striæ. Length, 4·5 mill.

Lower California.

Unfigured Species.

O. GRAVIDA, Gould. *California.*
O. BERINGII, Dall. *Alaska.*

O. VALLATA, O. TENUIS, O. SUBSULCATA, O. MAMILLATA, O. LAMELLATA, of Carpenter. *Mazatlan.*

O. AVELLANA, Carp. *Vancouver Isl.*

Section EVALEA, A. Ad., 1860.

O. TENUISCULPTA, Carp. Pl. 78, fig. 49.

Whitish, thin, diaphanous; whorls 3, besides the nucleus, with impressed suture, with rather wide spiral sulcations, three on the upper whorls and upper part of body-whorl, six subobsolete on the lower part of body-whorl; tooth acute, small.

Length, 2·5 mill.

——— *Neeah Bay.*

Unfigured Species.

O. ÆQUISCULPTA and O. DELICATULA, Carp. *Cape St. Lucas, L. Cal.*

O. SUBLIRULATA, Carp. *Mazatlan.*

Section PYRGULINA, A. Ad., 1863.

Unfigured Species.

P. ZIZIPHINA, P. PHOTIS, P. CONVEXA, P. LACUNATA, P. ARMATA and P. SCALARIFORMIS, Carp. *Mazatlan.*

P. NOTABILIS (Syns. *P. turrita*, C. B. Ad., *P. quinquecincta*, Carp.), and P. TEREBELLUM (Syn. *P. exarata*, Carp.), of C. B. Adams. *Panama and Mazatlan.*

P. CLATHRATULA, C. B. Ad. *Panama.*

IV. *Polynesian Species.*

O. INTERSTRIATA, Souverbie. Pl. 78, figs. 51, 50.

Thin, subpellucid, somewhat glossy, cinereous; whorls 7, longitudinally ribbed, the interstices with close spiral striæ; columella with a stout fold. Length, 4 mill.

New Caledonia, Samoa and *Viti Is.*

The last two localities are for *O. densecostata*, Garrett (fig. 50), which that gentleman, in a letter to me, acknowledges to be a synonym.

O. AMANDA, Garrett. Pl. 78, fig. 52.

Rather thin, subpellucid, somewhat shining, cinereous, longitudinally ribbed, constricted below the suture, forming a row of granules, interstices of equal width and spirally impressly striated; whorls 7, convex, suture deep and crenulated; tooth obsolete.

Length, 3 mill.

Viti Is.

O. PULCHRA, Garrett. Pl. 79, fig. 53.

Thin, slightly shining, remotely longitudinally ribbed, with wider, closely spirally ridged interstices; whorls 7, convex, narrowly shouldered above; white; plait small, oblique.

Length, 4·5 mill.

Viti Is.

O. SULCATA, Garrett. Pl. 79, fig. 54.

Rather solid, subpellucid, shining, white; whorls about 12, longitudinally grooved, with narrower interstices, gradually disappearing on the back of the body-whorl, suture deep; plait stout, callous. Length, 8·5 mill.

Viti Islands.

O. OBELISCUS, Garrett. Pl. 79, fig. 55.

Shell thin, hyaline, white, decussated by microscopical longitudinal lines and spiral impressed striæ; whorls 10, suture linear, margined; plait rather small. Length, 6·5 mill.

Viti Islands.

O. VITREA, Garrett. Pl. 79, fig. 56.

Thin, vitreous, pellucid, smooth, shining; whorls 11, suture linear, rather widely margined; aperture with revolving lamellæ within, fold stout; umbilicus with a small fissure.

Length, 7·5 mill.

Viti Islands.

O. EXILIS, Garrett. Pl. 79, fig. 57.

Fragile, pellucid, shining, white, finely longitudinally striated; whorls 6–8, convex, suture well impressed; columellar fold small. Length, 4 mill.

Viti Islands.

O. DENSESTRIATA, Garrett. Pl. 79, fig. 58.

Thin, pellucid, shining, white; whorls 11, flatly convex, closely, finely spirally striated, crossed by more delicate growth-lines, suture impressed; plait rather small. Length, 9 mill.

Viti Islands.

O. ORYZA, Garrett. Pl. 79, fig. 59.

Thin, smooth, glossy, white; whorls 7, flatly convex, suture faintly impressed, broadly margined; columella concave, slightly callous, with a rather small plait. Length, 3·5 mill.

Viti Islands.

O. CRYSTALLINA, Garrett. Pl. 79, fig. 60.

Rather thick, subpellucid, smooth, shining white, decussated by microscopic striæ; whorls 11–12, nearly flat, suture impressed; columella arched, callous, with stout plait. Length, 7·5 mill.

Viti Islands.

O. LUTEA, Garrett. Pl. 79, fig. 61.

Smooth, shining, luteous yellow; whorls 9–10, flatly convex, the last obsoletely subangulated on the periphery, suture impressed and margined; a slight umbilical fissure; plait distinct. Length, 7 mill.

Viti Islands; New Caledonia.

The last locality is for *O. rufula*, Souverbie. The description does not mention a sutural margin in that species, but it is indistinctly shown in the figure.

O. UNILINEATA, Garrett. Pl. 79, fig. 62.

Smooth, shining, subpellucid, white, with a yellowish brown line just above the suture; whorls about 11, convex, with deep suture; aperture lirate within, fold prominent.

Length, 10·5 mill.

Viti Islands.

O. CUSPIDATA, Garrett. Pl. 79, fig. 63.

Smooth, shining, creamy white, with a microscopical articulate darker line on the middle of the whorls; whorls 13–15, convex, the last showing growth-lines, suture deep; aperture lirate within, slightly expanded at the base; columella callous, fold stout; umbilicus fissured. Length, 11 mill.

Viti Islands.

O. ACICULINA, Souverbie. Pl. 79, fig. 64.

Smooth, subpellucid, white, with two orange-brown revolving lines, sometimes coalescing into a single broader band; whorls 11, longitudinally, minutely, impressly striate, suture impressed, sometimes spirally substriated on the base, varicose around the umbilicus; columella with an ascending plica. Length, 8 mill.

New Caledonia.

O. BULIMOIDES, Souverbie. Pl. 79, fig. 69.

Rather solid, corneous white, longitudinally subobliquely striated; whorls 9, slightly convex, with impressed suture; plait distinct. Length, 6 mill.

New Caledonia.

O. PUPÆFORMIS, Souverbie. Pl. 79, figs. 65, 66.

White, longitudinally costate, the equal interstices spirally impressed striate; whorls 9, slightly convex, suture rather deep; columella strongly plicate. Length, 5·5 mill.

New Caledonia; New South Wales.

O. Kreffti, Angas (fig. 66), is a synonym.

O. LÆVIS, Angas. Pl. 79, fig. 67.

Thin, subdiaphanous, shining, white; whorls 7, a little rounded, suture channeled; fold strongly developed. Length, 7 mill.

Port Jackson, Australia.

O. ANGASI, Tryon. Pl. 79, fig. 68.

Rather thin, smooth, shining, white; whorls 6, flattened, suture impressed; columellar fold strong. Length, 6 mill.

Port Jackson, Australia.

Described by Angas as *O. lactea*, preoccupied by Dunker.

O. (PARTHENIA) PASCOEI, Angas. Pl. 79, fig. 70.

Rather thin, rimate, pale yellowish brown; whorls 7, longitudinally rather closely plicate, plicæ evanescent on the basal portion of the last whorl, transversely finely striated; whorls 8, somewhat convex, suture well impressed; columellar plait moderate. Length, 8 mill.

Port Jackson, Australia.

O. VINCENTINA, Tryon. Pl. 79, fig. 72.

Moderately thin, white, regularly longitudinally ribbed, the interstices crossed by very fine hair-like striæ; whorls $7\frac{1}{2}$, slightly convex, contracted at the suture, suture profound; columellar plait strong. Length, 5 mill.

St. Vincent's Gulf, Australia.

The specific name is substituted for *O.* (*Parthenia*) *gracilis*, Angas, not Pease.

O. SIMPLEX, Angas. Pl. 79, fig. 71.

Rather solid, smooth, whitish; whorls $7\frac{1}{2}$, rather flat, a little angulated at the suture; aperture lirate within, plait sharp, transverse. Length, 4 mill.

Port Jackson, Australia.

O. STRIATA, Pease. Pl. 79, fig. 73

Subpellucid, whitish, spire sometimes stained yellowish or brownish, finely spirally striated; whorls 7, planely convex, slightly angulate at the well-impressed suture; fold distinct. Length, 5·5 mill.

Paumotus.

O. POLITA, Pease. Pl. 79, fig. 74.

Smooth, glabrous, whitish or yellowish; whorls 8, nearly plane, suture slightly impressed; columella callous, fold well-developed. Length, 6 mill.

Tahiti.

O. RUBRA, Pease. Pl. 79, fig. 75.

Longitudinally striated, and indistinctly so spirally, light rose color; whorls 9–10, plane, suture margined; columella slightly callous, fold small. Length, 10 mill.

Paumotus.

O. ROSACEA, Pease. Pl 79, fig. 76.

Solid, smooth, shining, rosy, paler at the base; whorls 5, plano-convex, suture obsoletely margined, with a row of obsolete light spots. Length, 7 mill.

Paumotus.

O. GRACILIS, Pease. Pl. 79, fig. 77.

Thin, elongated, finely spirally striated; whorls 6, flatly convex, acutely angulated at the suture. Length, 4 mill.

Sandwich Is.

O. DEBILIS, Pease. Pl. 79, fig. 79.

Rather thick, longitudinally striated, and very minutely so spirally; whorls 9, flat, acutely angulated at the suture, periphery obtusely angulated; white, spire rosy. Length, 9 mill.

Howland's Isl.

Undetermined Species.

O. OBTUSA, Gould. *Bonin Islands.*

O. BULLULA, Gould. *Loo Choo.*

V. *Asiatic Species.*

O. FASCIATA, Dunker. Pl. 79, fig. 81.

Very smooth, shining, white, with a thin band; whorls 8, flat, with incised suture; plait distinct; columella barely rimate.
Length, 5 mill.

Japan.

O. LACTEA, Dunker. Pl. 79, fig. 80.

Rather solid, white, shining; whorls 8, flattened, with deep suture; fold conspicuous. Length, 6·5 mill.

Japan.

O. COSTULATA, Dunker. Pl. 79, fig. 83.

Longitudinally costate, whitish; whorls 8, a little convex, suture distinct; plica oblique, strong. Length, 5 mill.

Japan.

O. CARINATA, A. Ad. Pl. 79, fig. 82.

Imperforate, thin, smooth, whitish; whorls 6, the upper ones unicarinated. The body bi-carinated, shouldered; plica distinct.
Length, 3 mill.

Persian Gulf.

Probably a monstrosity.

O. CLYSMATICA, Issel. Pl. 79, fig. 84.

Imperforate, solid, white, a little shining, transversely costulate; whorls $5\frac{1}{2}$, a little convex, suture margined, upper whorls longitudinally plicate, the last at the suture only; plait small.
Length, 2 mill.

Red Sea.

O. DECORATA, Phil. Pl. 79, fig. 85.

Longitudinally plicated, the wider interstices spirally striated, plicæ continuing to the base; whorls 6, slightly convex, with well-impressed suture; plait small. Length, 3 mill.

Red Sea.

O. CRATICULATA, Issel. Pl. 79, fig. 86.

Imperforate, yellowish white, solid, a little shining; longitudinally plicate, plicæ stopping at the periphery of the last whorl, spirally costulate throughout; whorls $6\frac{1}{2}$, flatly convex, suture profound; tooth small; umbilical region excavated.
Length, 3 mill.

Red Sea.

O. Sueziensis, Issel. Pl. 79, fig. 87.

Yellowish white, translucent, somewhat solid, smooth; whorls 6, rapidly increasing; suture lightly impressed, brown margined; tooth small. Length, 4 mill.

Red Sea.

O. solidula, Philippi. Pl. 79, fig. 88.

Subimperforate, white, smooth, shining; whorls 6; suture deep; lip striate within.

Red Sea.

Issel's figure shows indistinct spiral striæ.

Unfigured Species.

O. suturalis, O. subulata, O. Erythræa, O. doliaris, all of Philippi. *Red Sea.*

O. viridescens, O. physoides, O. lirata, O. puncticulata, Gould. *China Sea.*

O. subplanata, O. planata, Gould. *Hong Kong.*

O. scalarina, O. soluta, Gould. *Loo Choo.*

O. subdiaphana, O. achatinella, O. pruinosa, O. neglecta, O. cana, O. nivea, O. goniostoma, O. ovoidea, O. subangulata, O. vitrea, O. pygmæa, O. nana, O. Japonica, O. ventricosa, O. obesula, O. pupa, O. tenera, O. scalina, O. elata, O. hyalina, O. oblonga, O. (Auriculina) ovalis, O. (Auriculina) Grayi, O. (Evalea) pyramis, O. (Evalea) arcuata, O. (Evalea) elegans, O. (Miralda) diadema, O. (Miralda) gemma, O. (Miralda) Mariella, O. (Parthenia) cœlata, O. (Parth.) casta, O. (Parth.) Minna, O. (Parth.) Brenda, O. (Parth.) elegantula, O. (Parth.) pygmæa, O. (Parth.) pulchella, O. (Parth.) concinna, O. (Parth.) miranda, O. (Parth.) pura, O. (Parth.) cœlata, O. (Parth.) bellula, O. (Parth.) fenestrata, O. (Pyrgulina) decussata, O. (Pyrg.) tantilla, O. (Parth.) spirata, O. (Parth.) littoralis, O. (Parth.) punctigera, O. (Chrysallida) semiplicata, O. (Parth.) Pagodula, O. (Parth.) pusio, O. (Parth.) foveolata, O. (Parth.) costellata, all of A. Adams. *Japan.*

O. vitræa, O. ellipsoidea, O. canaliculata, O. Megacheilos, G. acutelirata, O. fallax, O. Nevilli, Folin. (Descriptions are inaccessible to me.) *Andaman Isl.*

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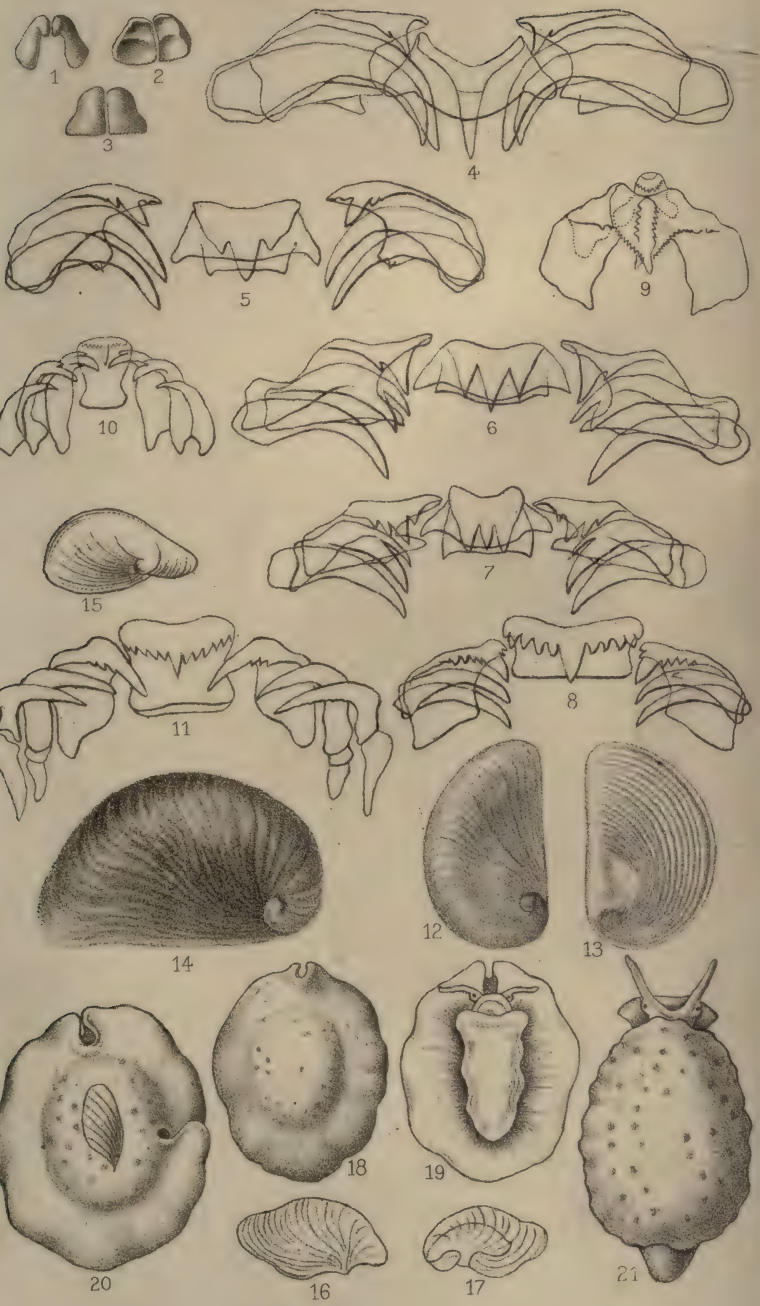

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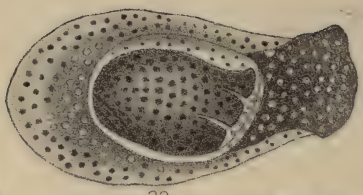

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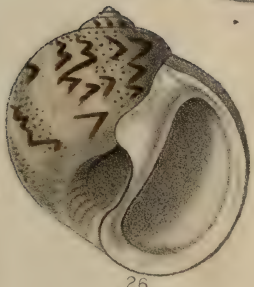

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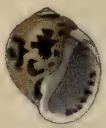

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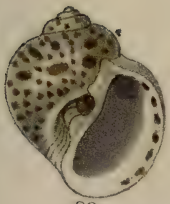

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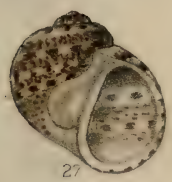
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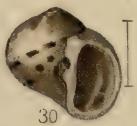
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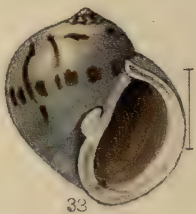
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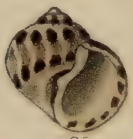
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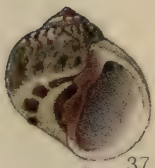
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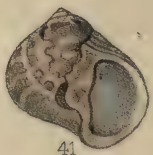
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PRESE LIB
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THESE LIBRARY
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REESE LIBRARY
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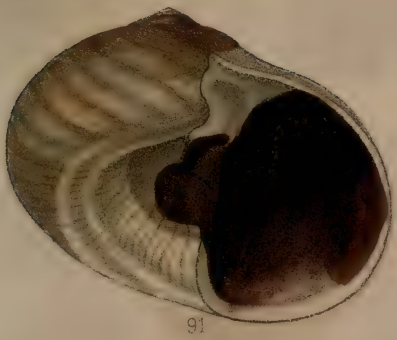
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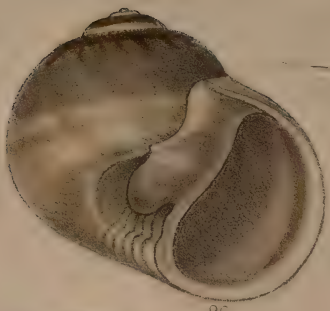
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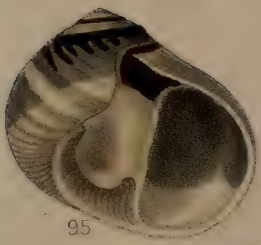
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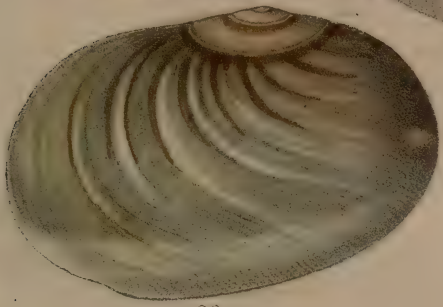
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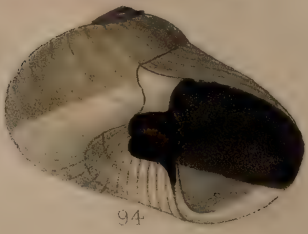
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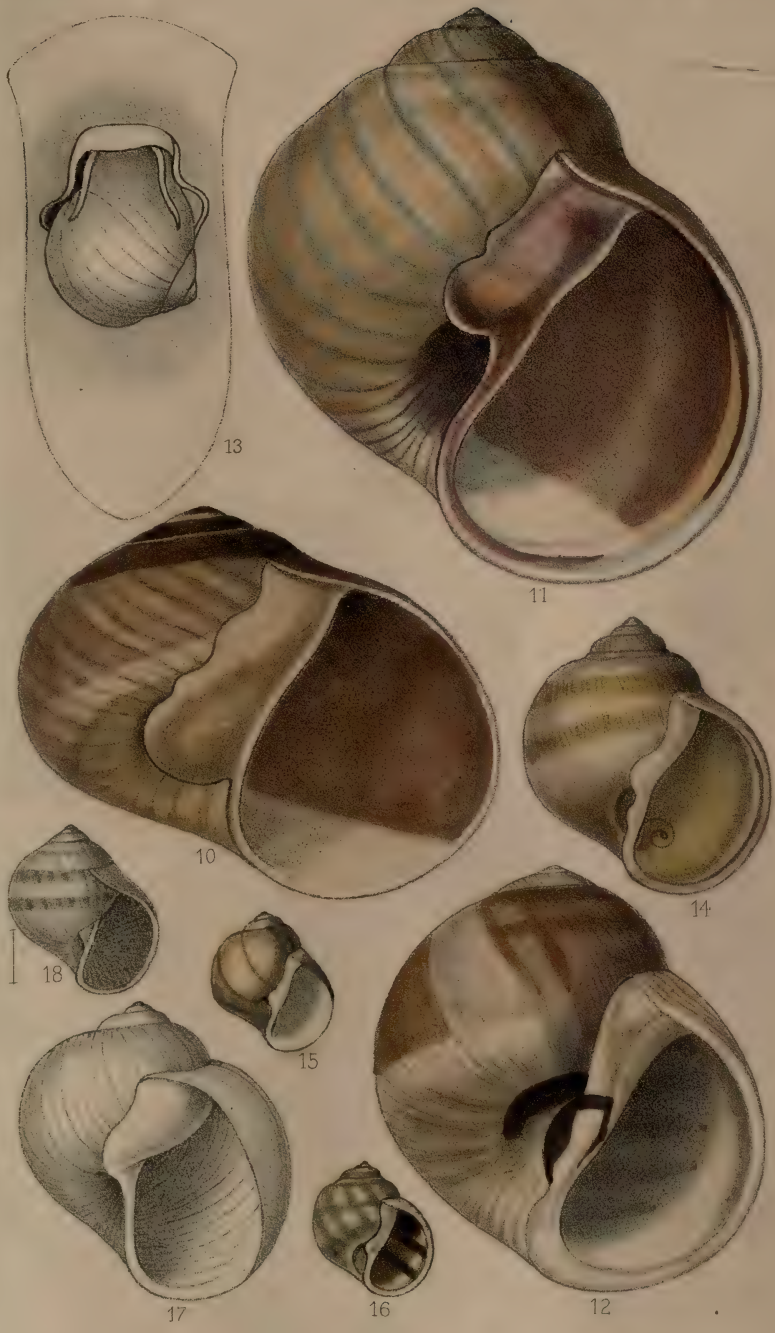
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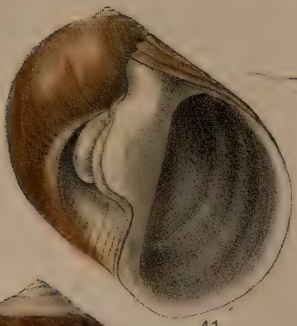
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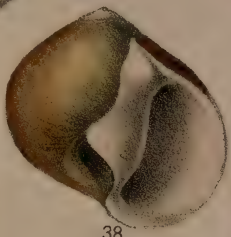
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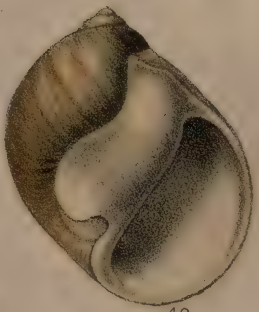
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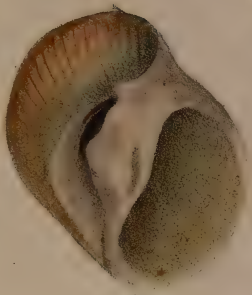
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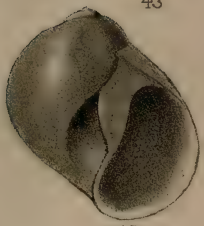
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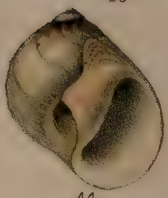
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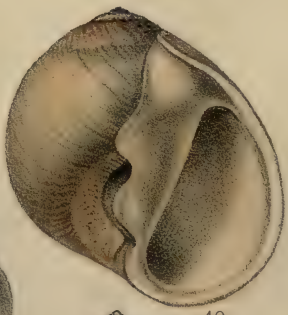
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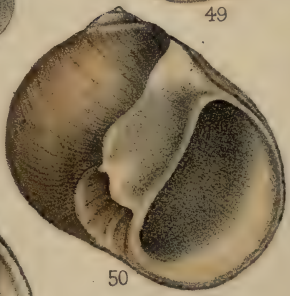
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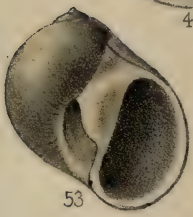
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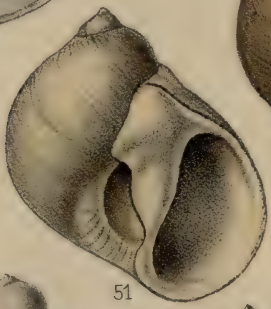
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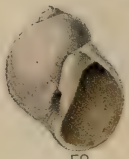
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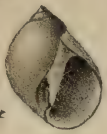
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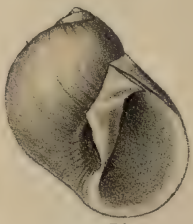
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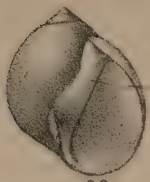
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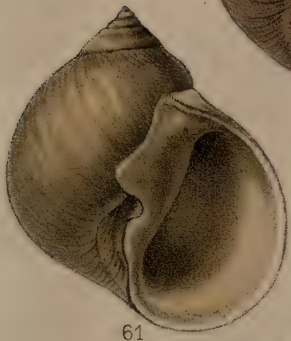
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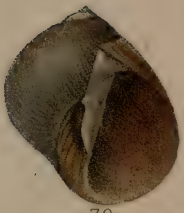
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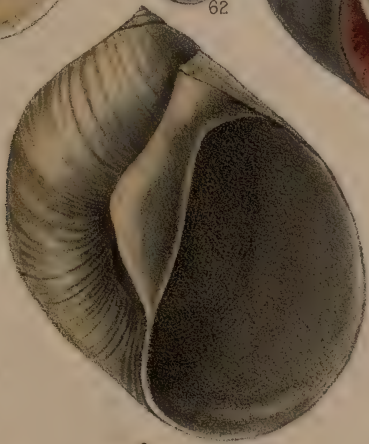
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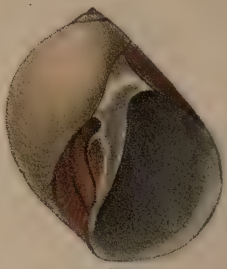
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LAW LIBRARY
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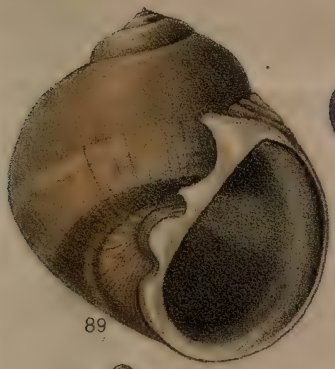
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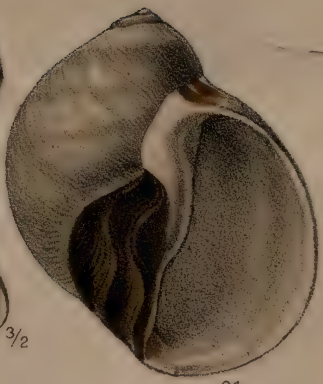
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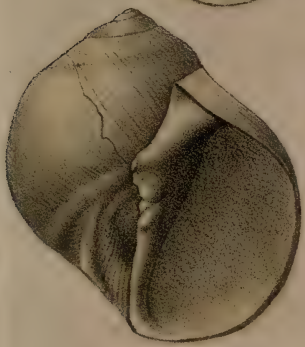
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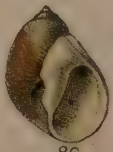
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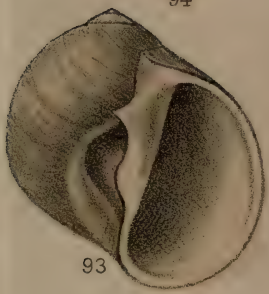
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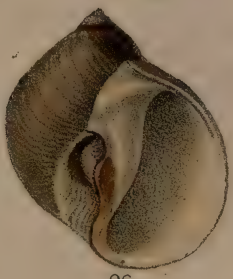
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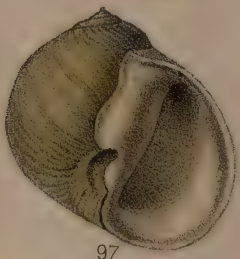
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PEABODY LIBRARY
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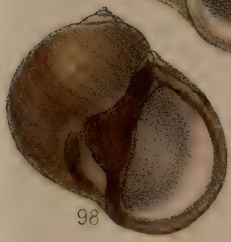
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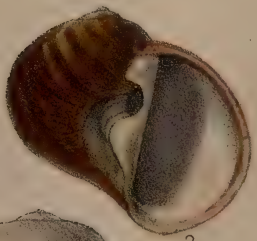
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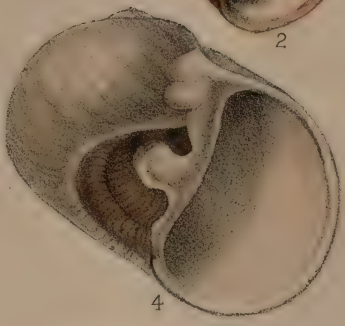
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PRESSE LIBRARY
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STATE LIBRARY
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REESE LIBRARY
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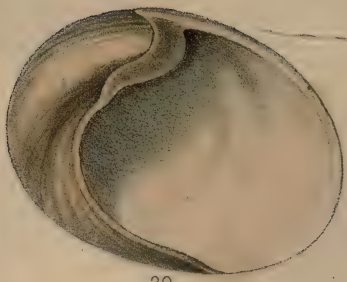

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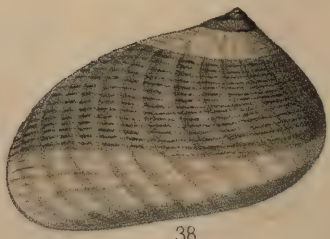

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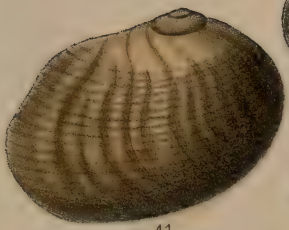

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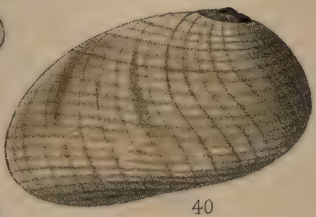

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HOEFS LIBRARY
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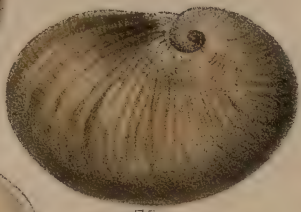
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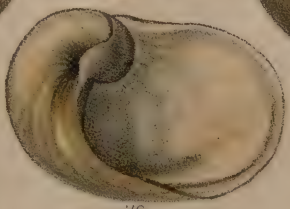
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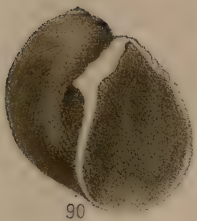
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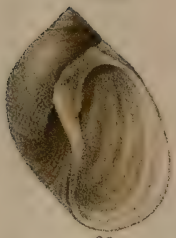
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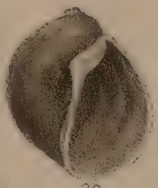
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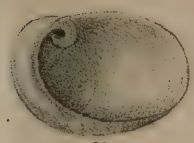
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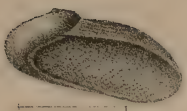
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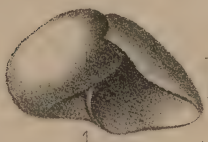
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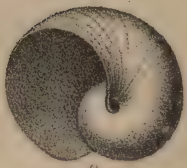
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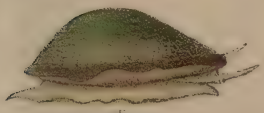
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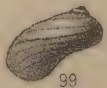
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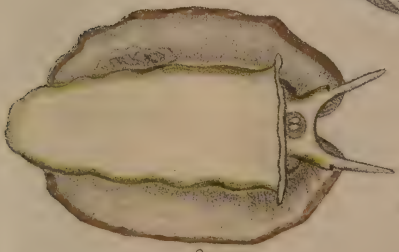
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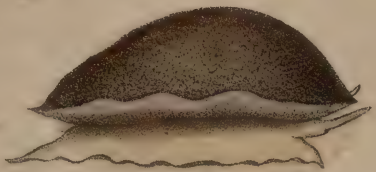
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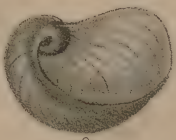
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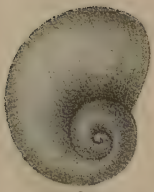
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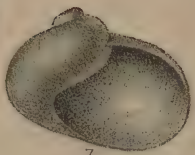
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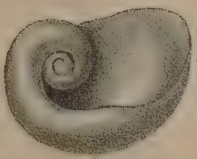
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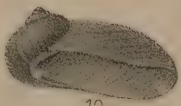
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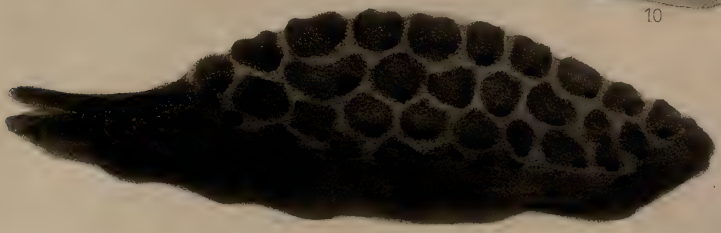
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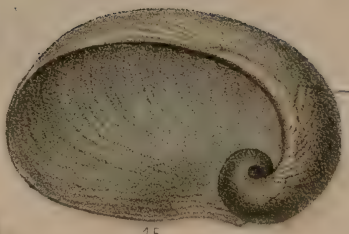
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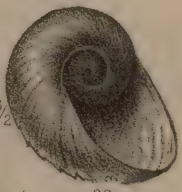
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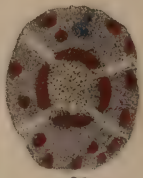
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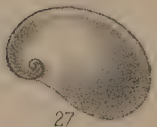
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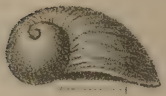
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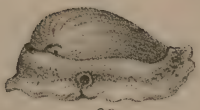
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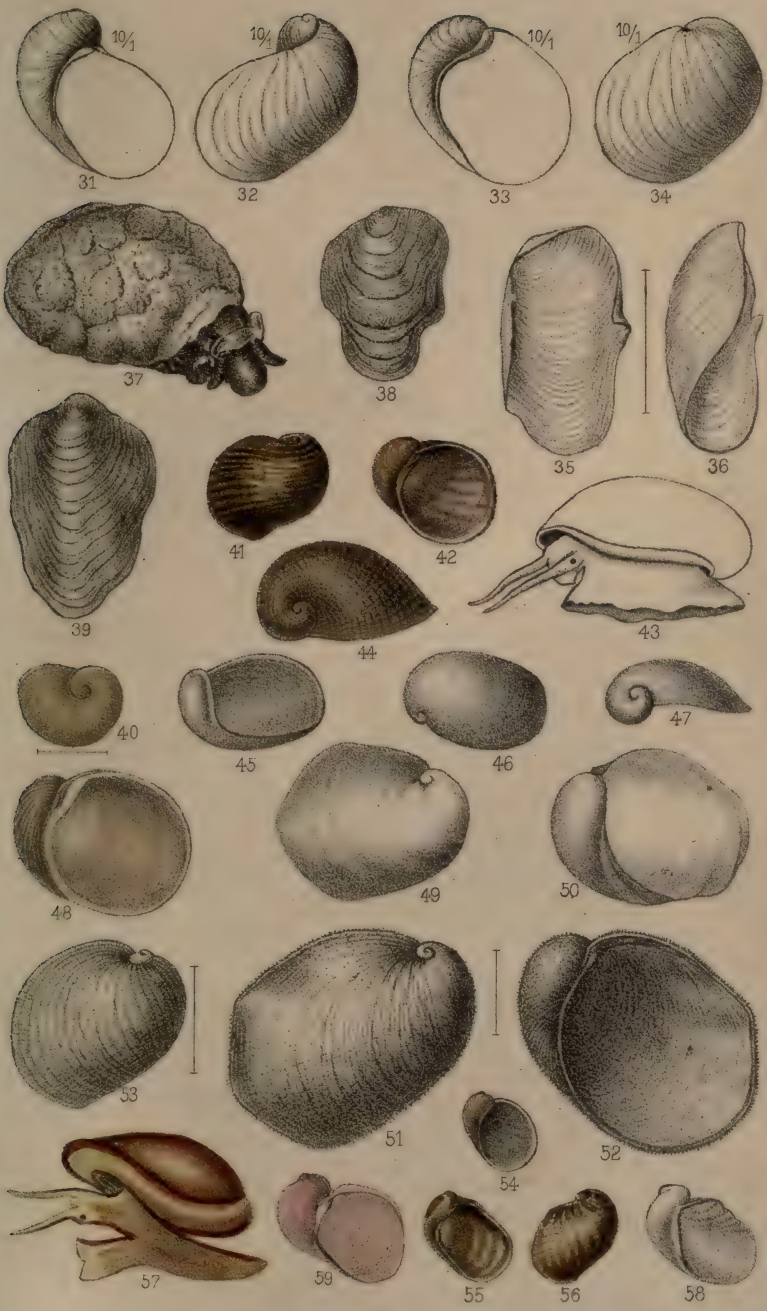
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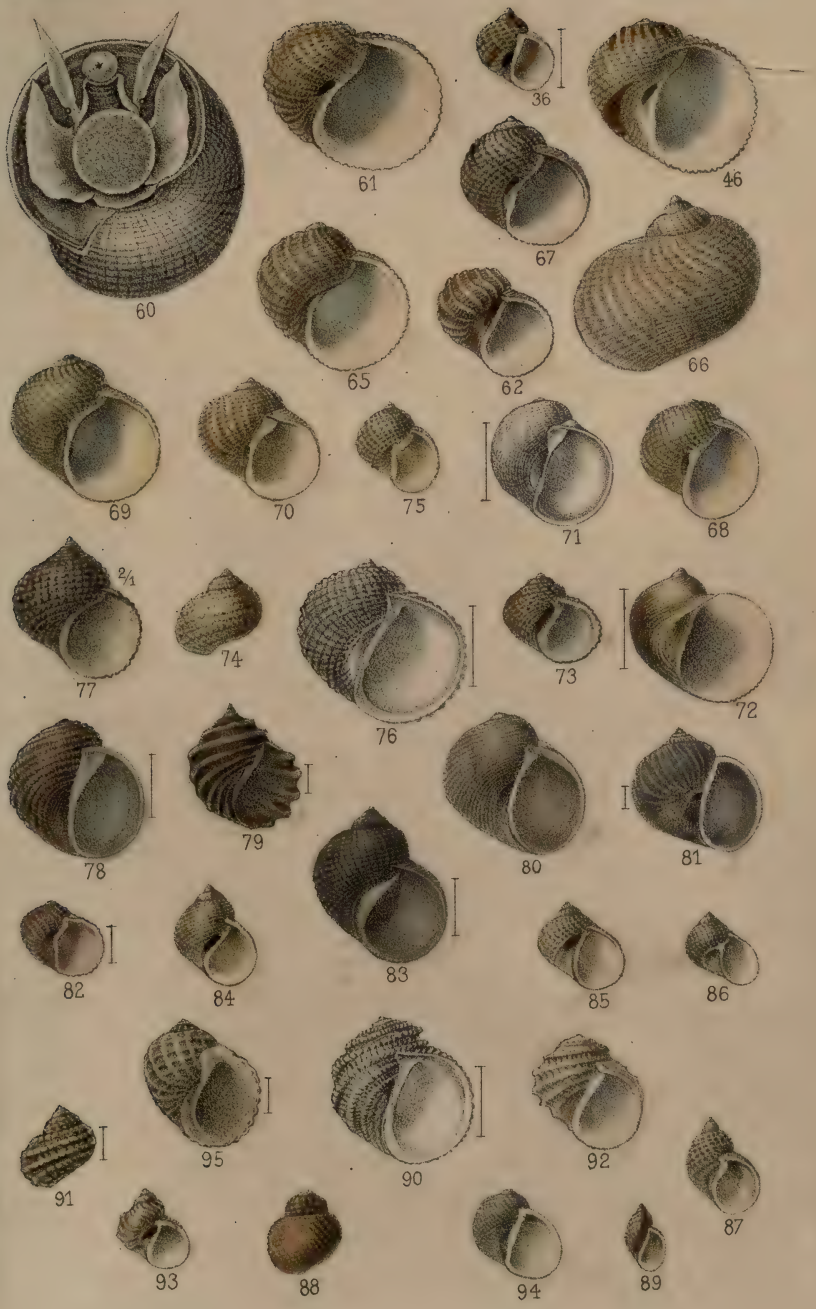
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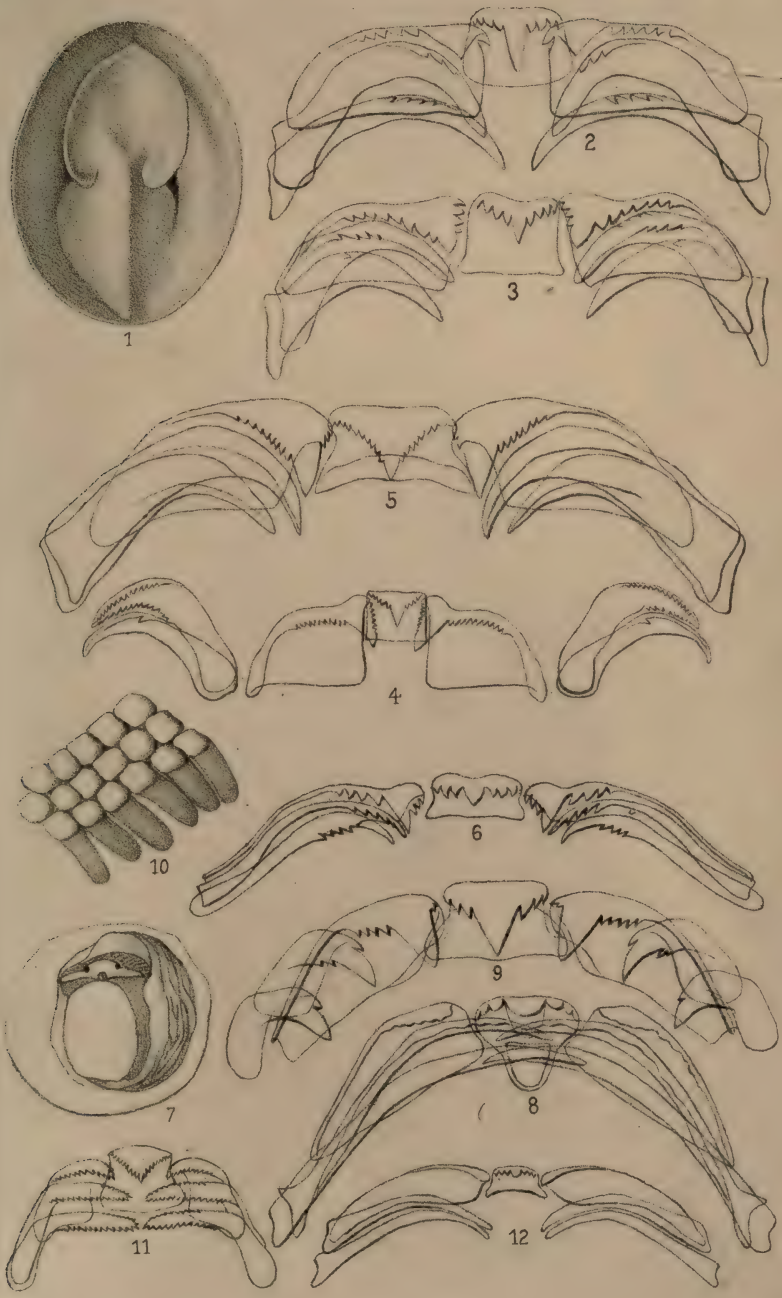
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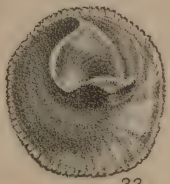
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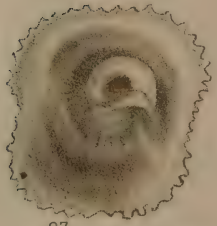
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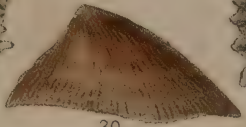
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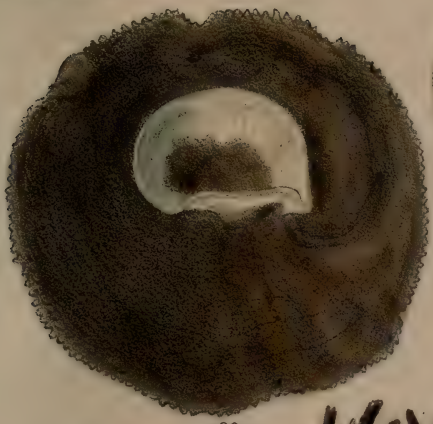
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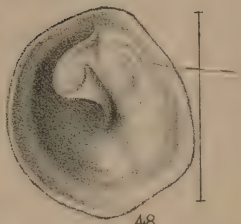
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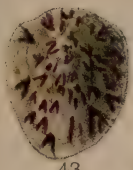
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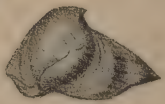
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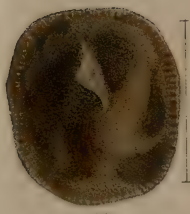
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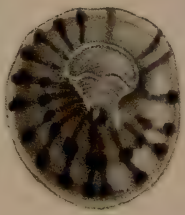
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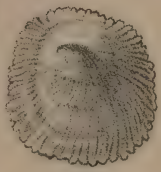
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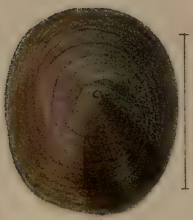
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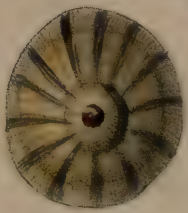
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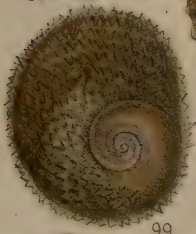
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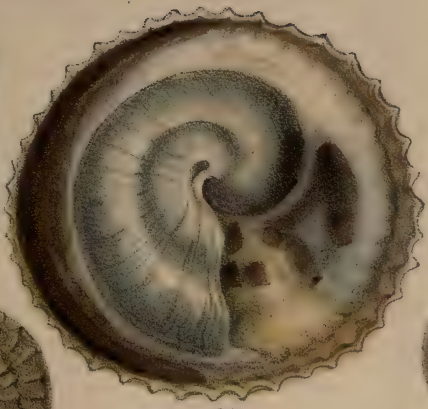
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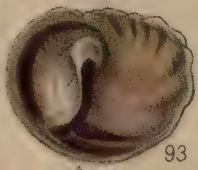
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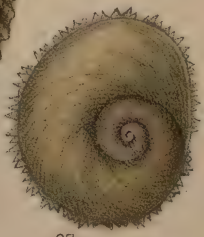
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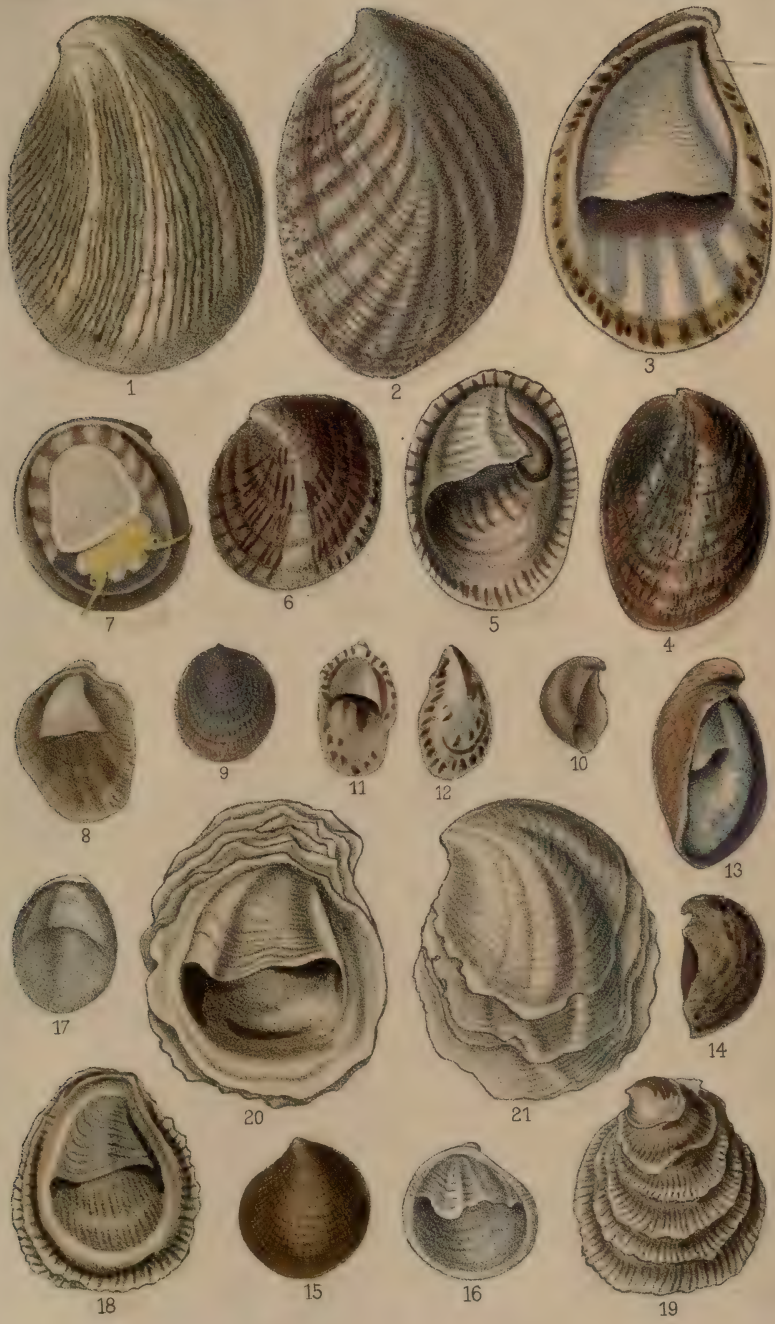
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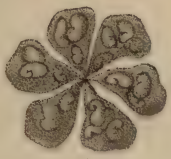
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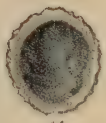
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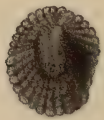
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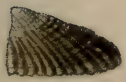
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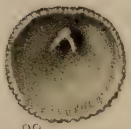
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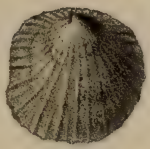
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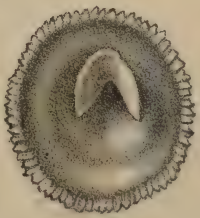
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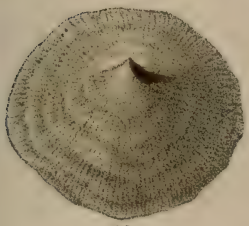
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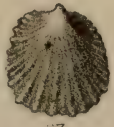
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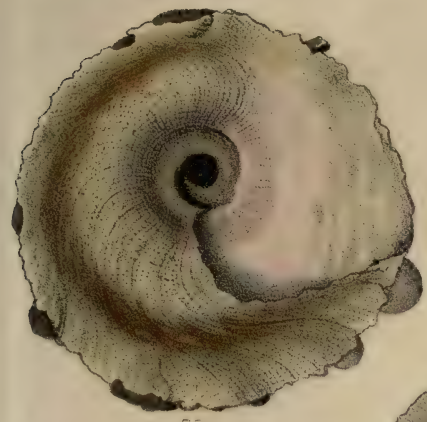
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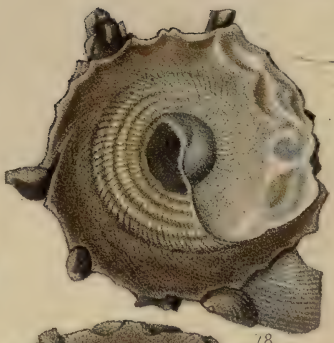
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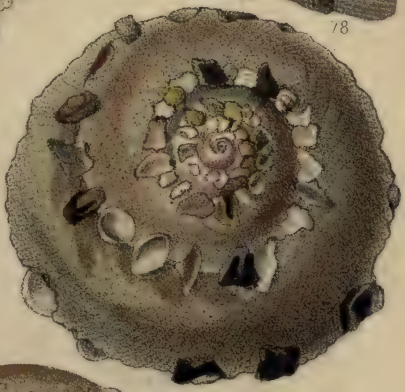
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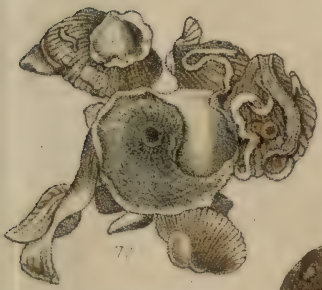
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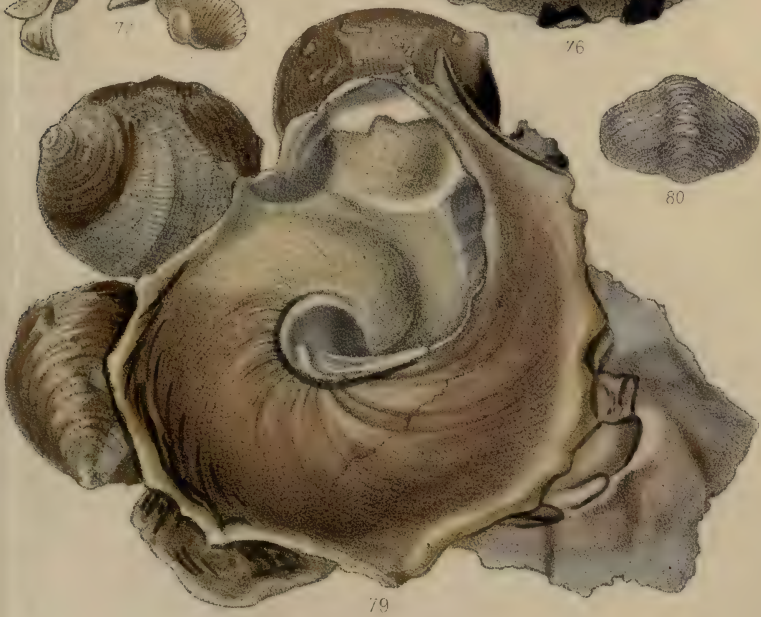
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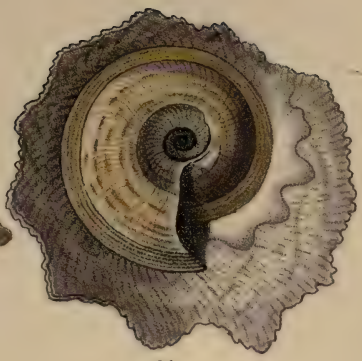

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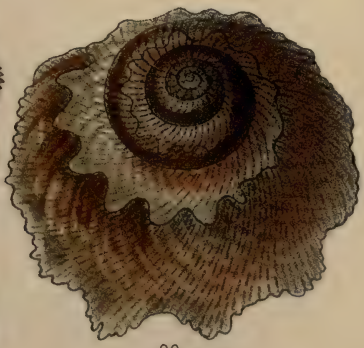

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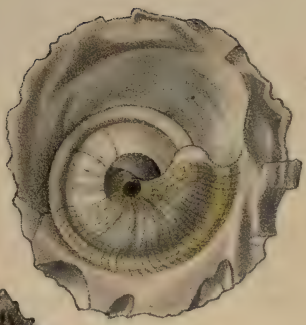

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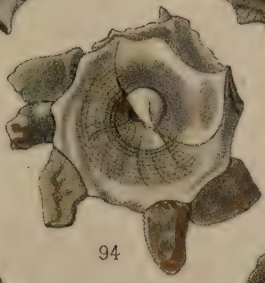

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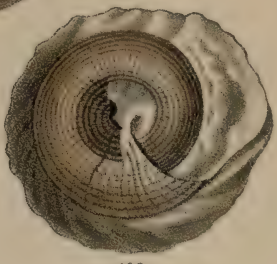

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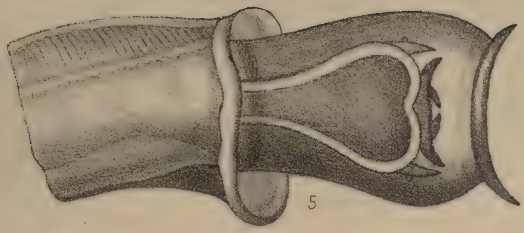
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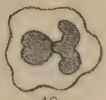
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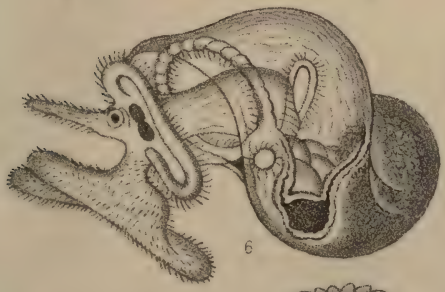
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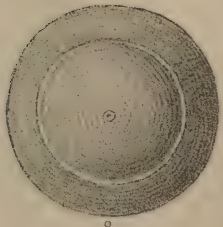
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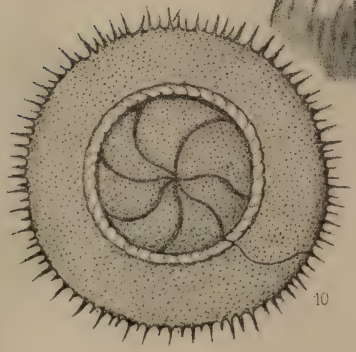
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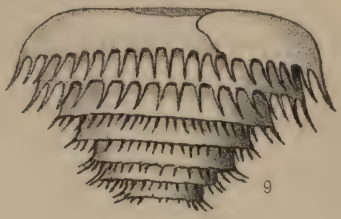
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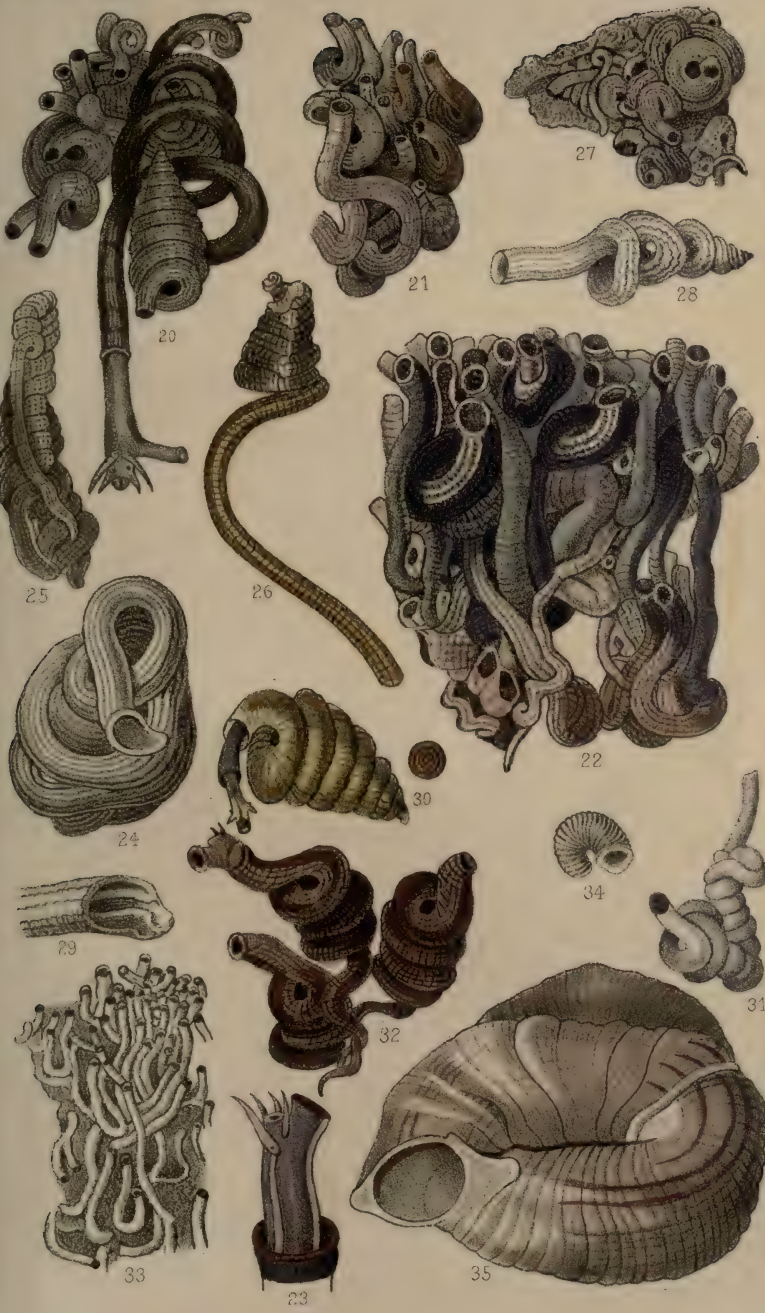
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PEABODY LIBRARY
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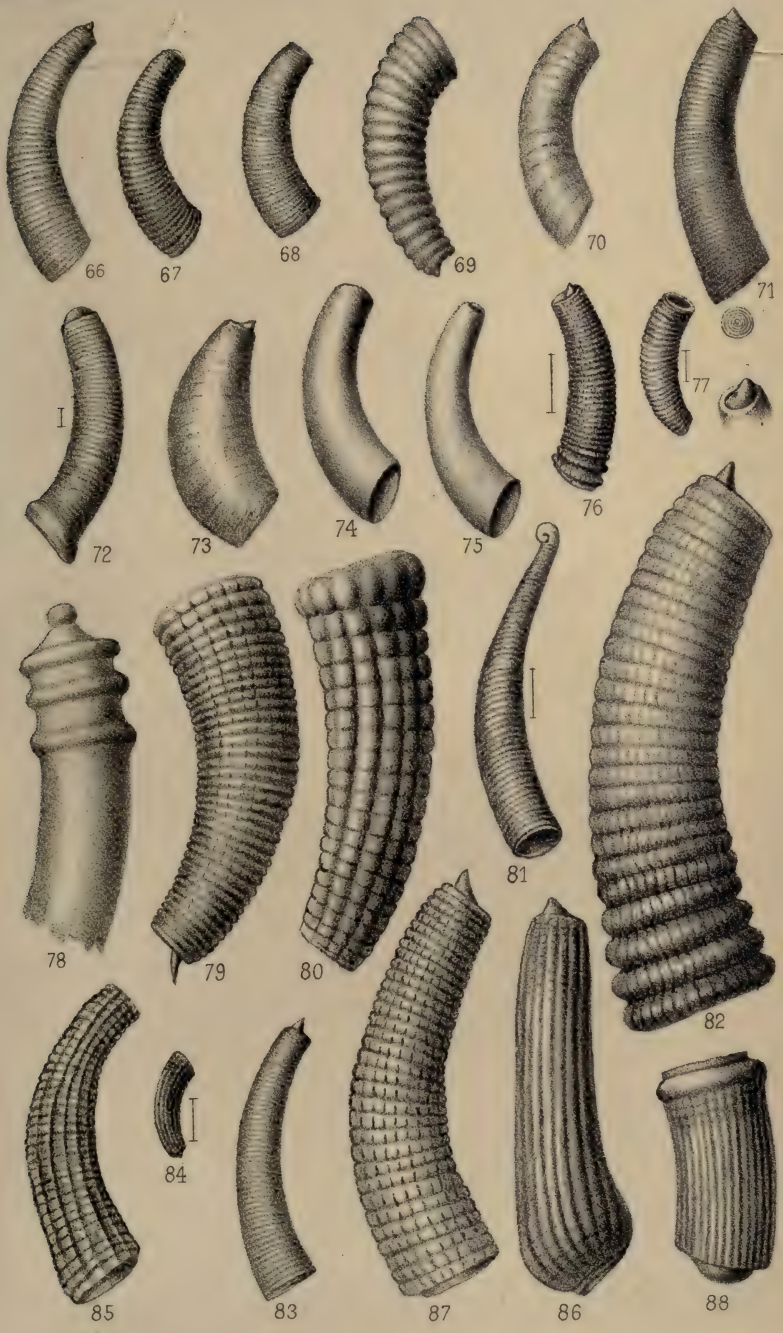
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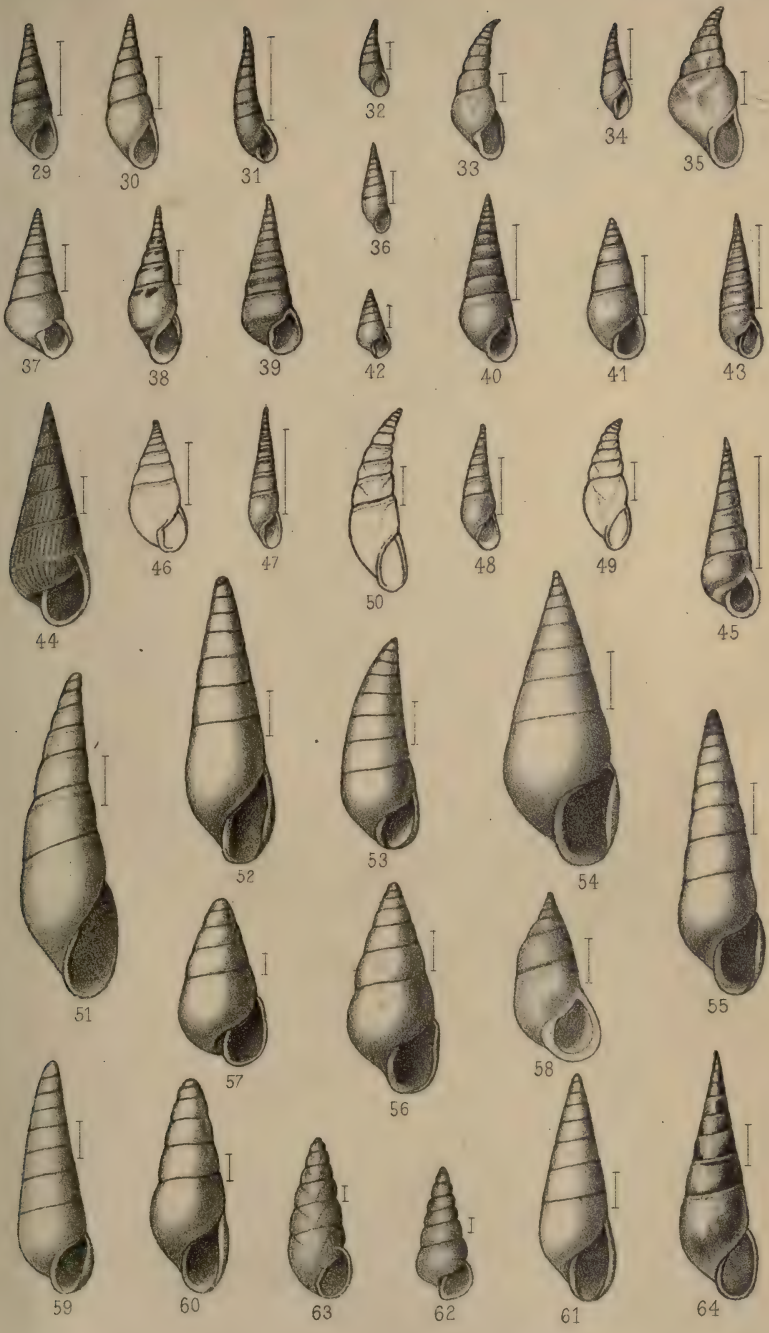
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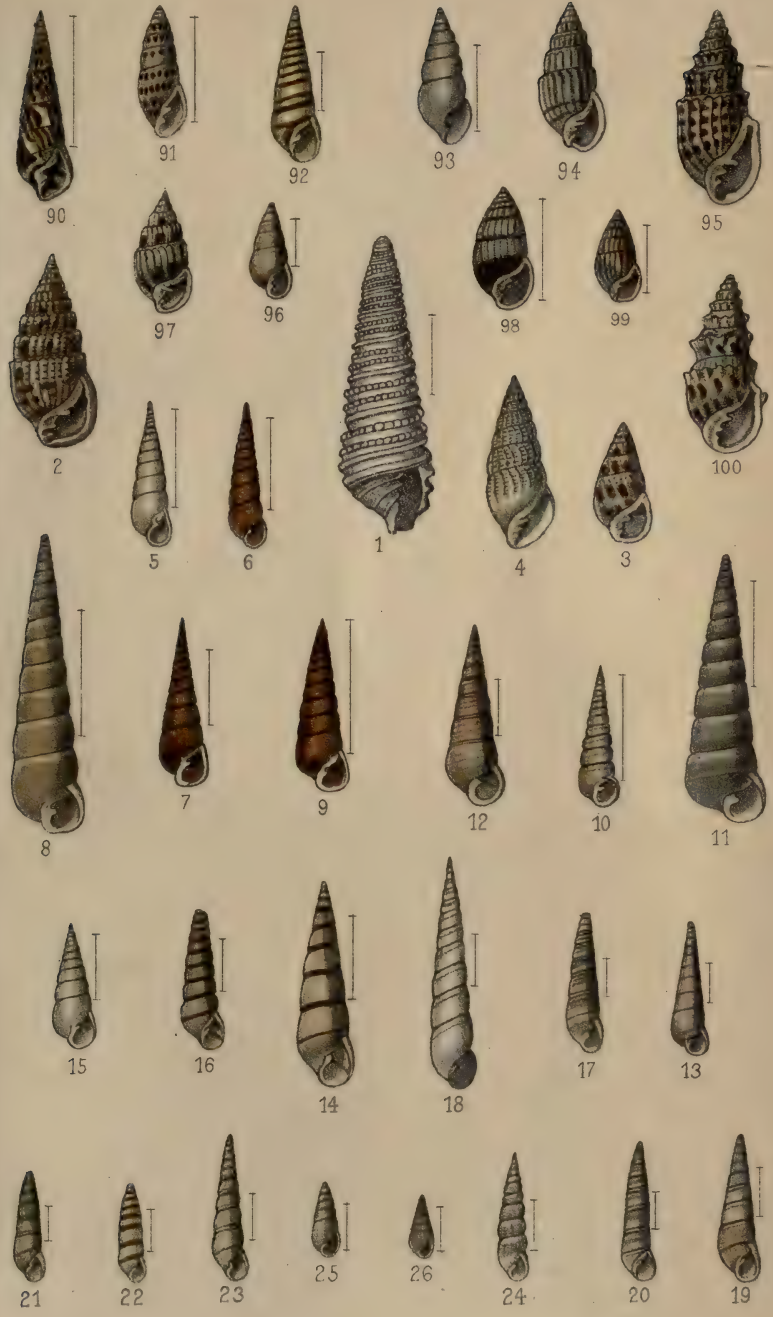
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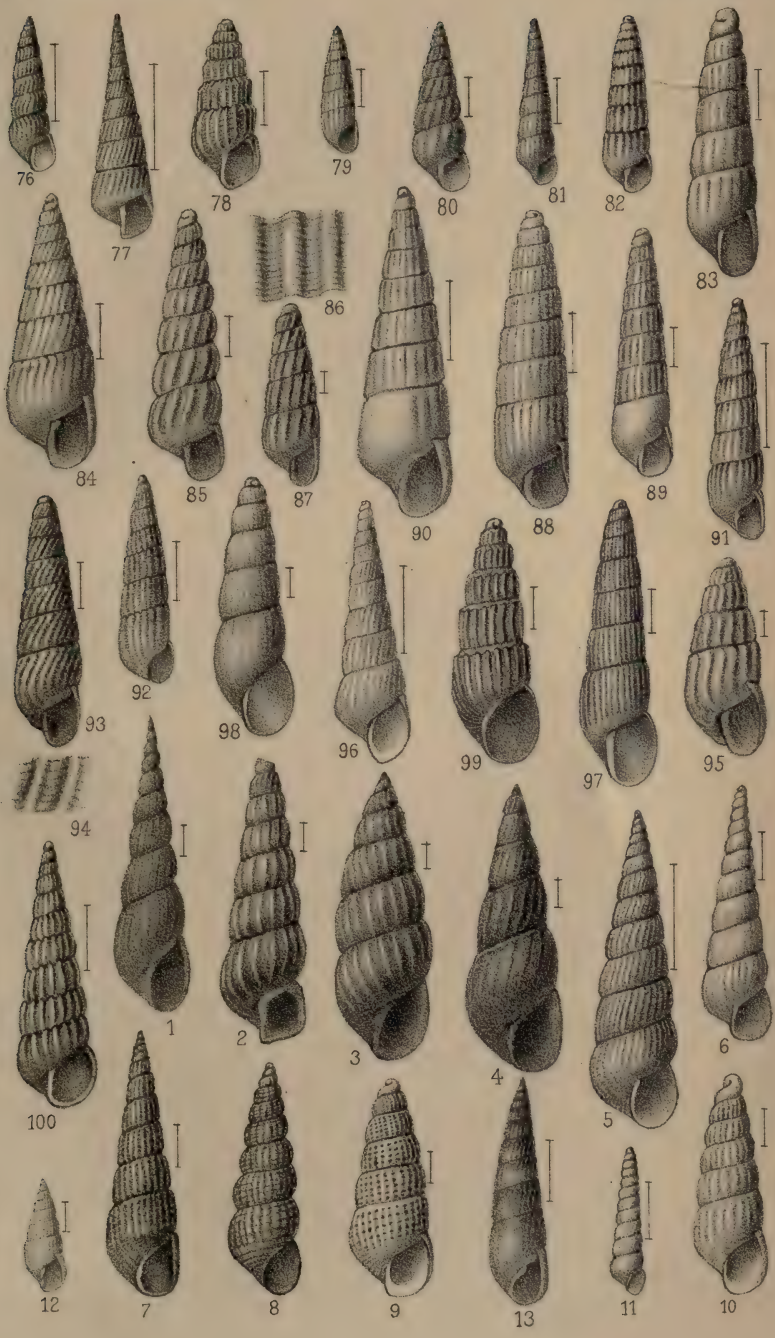
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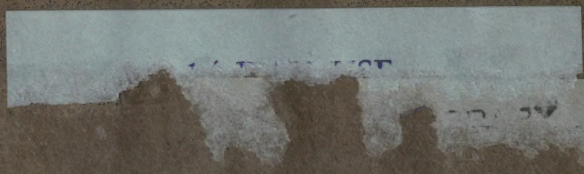

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